This is a digital copy of a book that was preserved for generations on library shelves before it was carefully scanned by Google as part of a project to make the world's books discoverable online.

It has survived long enough for the copyright to expire and the book to enter the public domain. A public domain book is one that was never subject to copyright or whose legal copyright term has expired. Whether a book is in the public domain may vary country to country. Public domain books are our gateways to the past, representing a wealth of history, culture and knowledge that's often difficult to discover.

Marks, notations and other marginalia present in the original volume will appear in this file - a reminder of this book's long journey from the publisher to a library and finally to you.

Usage guidelines

Google is proud to partner with libraries to digitize public domain materials and make them widely accessible. Public domain books belong to the public and we are merely their custodians. Nevertheless, this work is expensive, so in order to keep providing this resource, we have taken steps to prevent abuse by commercial parties, including placing technical restrictions on automated querying.

We also ask that you:

+ *Make non-commercial use of the files* We designed Google Book Search for use by individuals, and we request that you use these files for personal, non-commercial purposes.

+ *Refrain from automated querying* Do not send automated queries of any sort to Google's system: If you are conducting research on machine translation, optical character recognition or other areas where access to a large amount of text is helpful, please contact us. We encourage the use of public domain materials for these purposes and may be able to help.

+ *Maintain attribution* The Google "watermark" you see on each file is essential for informing people about this project and helping them find additional materials through Google Book Search. Please do not remove it.

+ *Keep it legal* Whatever your use, remember that you are responsible for ensuring that what you are doing is legal. Do not assume that just because we believe a book is in the public domain for users in the United States, that the work is also in the public domain for users in other countries. Whether a book is still in copyright varies from country to country, and we can't offer guidance on whether any specific use of any specific book is allowed. Please do not assume that a book's appearance in Google Book Search means it can be used in any manner anywhere in the world. Copyright infringement liability can be quite severe.

About Google Book Search

Google's mission is to organize the world's information and to make it universally accessible and useful. Google Book Search helps readers discover the world's books while helping authors and publishers reach new audiences. You can search through the full text of this book on the web at `http://books.google.com/`

49. 16.

NEW FORMS

IN

ARCHITECTURE,

FOR

IRON,

SLATE SLAB, HOLLOW BRICK POTTERY,

FIRE AND ROT-PROOF TIMBER,

AND OTHER

Superior and Economical Materials,

FOR WHICH THE ESTABLISHED

FORMS

OF THE BUILDING ARTS ARE

WASTEFUL AND INCONVENIENT.

LONDON:
JOHN OLLIVIER, 59, PALL MALL.
1849.

[A portion of the following Work forms the Fifth Article of the 100th No. of the "Westminster and Foreign Quarterly Review," April, 1849.]

BIBLIOTHECA · BODLEIANA ·
DOMINUS ILLUMINATIO MEA

LONDON:
WATERLOW & SONS, PRINTERS, 66 AND 67, LONDON WALL.

NEW FORMS IN ARCHITECTURE,

&c. &c.

ARCHITECTURE being an Art of Form—affecting the combination of beauty with utility in building, the character, fitness, and efficiency of the same in respect to the uses or purposes to which its productions are applied, is a question of the most vital and paramount importance.

The quality of the materials selected for the general or particular purposes of Building Construction necessarily exercises considerable influence on the durability, healthfulness, cleanliness, and general appearance of its parts and surfaces. But the first principle of *Beauty* in structure being *Form*—the first principle of *Utility* in structure being *Form*—and the most important element in the development of *Economy* therein being *Form*, it is conclusive that the properties and qualities of this primary concomitant of the Art, in their relation to the immediate exigencies and resources of society, is that alone by which the excellence or inferiority—whether of the most magnificent edifices or of the humblest class of buildings (which necessarily follow their primitive types)—can be determined.

The beauties of architecture, like those of nature, should be conformable with, and expressive of, the character of its utilities; while these, in their turn, are required to express the characteristics of period, climate, and people, in the respective epochs of their development.

But the simple fact that we are still, in the meridian of the nineteenth century, engaged in copying the precise forms and arrangements of building arts which originated in the necessities and peculiar circumstances of remote times, and were adapted to climates and conditions of society widely different from our own, presents a perfect contrast to every other department of practical science, and affords evidence of an unsatisfactory state of architecture, inconsistent with that spirit of progress which is the general characteristic of the present age.*

By those whose fancied interest it is to uphold and perpetuate the dogma, that "the attainment of excellence in our national edifices and general style of building is dependent upon our servile and indiscriminate adaptation of the forms and arrangements of antiquity,"—the British public have long been charged with indifference to the merits of the art. But may not the cause of this indifference be traced to—nay, is it not the immediate consequence of—the inadequacy of the means employed to meet the wants and feelings of that very public? What is there in the state of architecture to gratify "the noble passion, miscalled pride," the patriotism of a great and energetic nation? Were the principles of the art worked out of the brain of Englishmen? Did its forms and combinations receive their first development on our shores? Was their character determined by the peculiarities of our climate, or the circumstances and habits of our people? No. Of what then have Englishmen to be proud? The British nation may expend its millions in the erection of costly edifices; but the essential honour and glory of the work belongs to the Greek, or to the Roman, or to the Innovating artists of the Middle Ages. The "Shakspeares" of architecture are not, and never have been, our own; and if the English people are indifferent to the art, the cause of their indifference may be traced to this important and expressive fact.

But if architecture has hitherto failed to excite the enthusiasm of our people, through its short-comings and deficiencies in the expression of their sentiments and characteristics, it equally fails to contribute to the extension of their power and interests. Commerce cannot aggrandize herself, or only to a very limited extent, by its productions; and so long as England continues what she is—an enterprising nation, full of hope in the future—while incessantly demanding all the aids and appliances of active and laborious intellect, and Architecture excluding from her view the world of improvement and extension, which is all before her—continues absorbed in, and satisfied with retrospections, and reproductions of the past, there can be little hope of its advancement in the general estimation of the people at large.

With Bentham, who maintained the principle of utility to be the proper foundation of human laws, we contend that UTILITY is the only true basis of architecture; utility, which, in Art as in Nature, is calculated not only to minister to the comfort and happiness of physical existence, but to satisfy the longings of the mind after the Beautiful; and this not the utility of the past misapplied to the present, but that which, upon the closest examination, shall be found conformable with the wants and requirements of our own age and country.

---

* The periods of the origin and perfection of the standard styles of architecture in common use, are found to range as follows:—The Greek, from about 1,000 to 450 B.C.; the Roman, from the 1st century B.C. to the 3rd of our era; the Gothic from the 11th to the 16th century; and the Italian from the 15th century onwards.

When we reflect upon the many and great changes which not only two or three thousand years, but even the lapse of a single century, will effect in the condition and circumstances of society, it is by no means surprising that in an art, the excellence of which, from age to age, is so largely affected by these ever-varying contingencies—that that which is justly entitled to the palm of excellence in one age or country, should be found totally inefficient and inconsistent in another.

The architects of ancient Egypt, for example, found the required sites for their temples exposed to frequent inundations from the annual overflowings of the Nile. Hence the massive and broadly spreading bases which gave solidity, and, under such circumstances, imparted effective beauty to their structures. The originators of the Grecian architectures, on the contrary, had very high, and dry, and hot situations to adapt their arrangements to; and as rain seldom falls in Greece, they were enabled to dispense with windows, or other means of light and ventilation to their temples, by leaving large central openings in the roof. The purpose of their porticos and colonnades, in addition to presenting a grand and imposing relief to the monotony of bare and unperforated walls, was unquestionably to protect the edifice and its congregations from the piercing effects of the sun, which, on a naked rock of some hundred feet above the common level, and in a climate such as that of Athens, is peculiarly oppressive. The ancient Romans also, together with the more modern Italians, as well as the originators of Gothic architecture, claim—certainly in different degrees, but nevertheless justly claim—the merit of adapting their successive modifications of the art of construction to the altered circumstances of the times and to differences of climate, as well as to differences of materials. And how, it may be asked, can we, in the nineteenth century, really imitate the example of these ancients, but by striving to do, not *what* they did—by the actual and servile copying of their forms—but *as* they did, by the invention and working out of forms and arrangements adapted to the different character of our own climate and the altered condition of our own times?

The very nature and character of the forms of present architecture (as will hereafter be shown) are not only inadequate to the development of the economy of the most valuable material we possess, but are totally at variance with many of the most prominent and essential arrangements of modern society. Look, for example, to the now extensive demands upon the building art for the rapidly increasing purposes of our Railway establishments,—things which did not even enter into the dreams of poets in the age in which any of the present styles of architecture originated. Look, again, to the number of costly shops, of houses of business, and of private dwelling-houses, for which the largest and most pressing demands upon the art are now made; and then consider the fact, that not one of the present styles of architecture originated in application either to commercial or domestic purposes; and say if it be any other than a natural result of our absurd adherence to the antique arts—that, whatever they might have been to the ages and people that produced them, they are neither perfect nor excellent in application to the wants and circumstances of our own people and country.

The first concomitant of beauty in architecture—equally with the works of Nature—is *fitness* for the purposes to which its productions are applied. The beauty everywhere perceptible in creation is, in every instance, based upon the most perfect utility and suitability to the circumstances in which the creature is placed. The camel is framed in conformity with the parching climate of the desert — the reindeer with that of the frozen regions—the goat for the mountains—animals which subsist upon the plants and foliage of trees are provided with long legs and necks—those that feed on pastures, with short ones—and so on; all are adapted to the wants and necessities of their condition; and in that condition, and for the fulfilment of the uses for which the Great Author of nature designed them, are, from that very fitness and utility, beautiful.

Circumstance has an equally important influence on the effect of the beautiful in architecture. Could we, at this moment, transport ourselves to the bright and sunny land of Greece—not as she now is, mourning in dust and ashes over the ruins of her former greatness, but as she was wont to appear when Art essayed her most effectual rivalry with Nature's beauty—what would be our feelings? Standing upon the very ground made sacred by the tread of Homer, of Socrates, of Plato, and a host of great and noble names which shine forth for ever to the glory of humanity, as stars in the vaulted canopy of heaven; and looking up from the base of the Acropolis, where the eye is suddenly arrested in its course by the sublime and majestic aspect of the temple, consecrated to the worship of that *one* great attribute of the omniscient mind—comprehended in the embodied form of their Minerva; surrounded by a climate in which the physical wants of humanity are so bountifully supplied by the hand of Nature, as to need but a small amount of care and exertion on the part of man; and contemplating a description of edifice in which those wants and necessities are rendered less obvious from the purpose to which it is devoted:—could the state of mind which arises from these associations be realized on beholding any one of the innumerable applications of antique forms to the varied purposes of modern life in modern England? Were it possible, then, indeed, as a nation, we might perhaps continue justified in abandoning the exercise of the higher powers of creative and inventive mind in the practice of architecture, and in perpetuating the obsequies of Art, by the perpetuation of mechanical and methodical imitation.

Let, however, prejudice and physical precedent, the contracting influences of technical education, and the force of habit be but for one moment laid aside, and Reason be installed in her legitimate office, as umpire in the decisions of the mind, we shall soon discover how and why it is that "our specimens of antique art,"—as we are wont to term them,—do not produce that feeling of mental gratification, which, in the circumstances by which their primary production was attended, they were so eminently calculated to occasion; and why it is that the great mass of the enlightened population of this country continue in a state of comparative indifference to the condition and general subject of architecture.

The massive colonnades which surround the Grecian temples are unquestionably sublime and beautiful, when crowning the lone summit of their Acropolis. But take that colonnade, and place it, for example, at a railway station, where chains of carriages are continually arriving to pour forth their streams of passengers and bales of luggage,—where individuals are crowded and crushed between the enormous barriers of columns,—which, in their turn are becoming continually defaced and broken through the contact of wheels and packages; and how is it possible that the sublime and beautiful can be there recognised or appreciated? Nay, how is it possible that something rather akin to disquiet and contempt should not be felt, at the presence of forms and arrangements so diametrically opposed to the dictates of reason and the demands of utility? And yet, such is the state of hopeless degradation which, not the just and enlightened *use* of ancient example, (for that would lead to a philosophical imitation of motive), but the blind and tyrannous *abuse* of antiquarian orthodoxy in the servile transcript of its forms, would perpetuate, that we must either submit to these annoyances and inconsistencies, or renounce, in all such cases, the proffered services of architecture and the consequent presence of beauty.

Again, let us note the consequences of similar introductions into the architectural arrangements of our own metropolis. In the first place, the sites upon which the majority of our public buildings are situate, present the most perfect contrast to those of Greece (whence the portico and colonnade of every other and subsequent style of art is derived), which tower in the air, on a summit some hundred feet above the spectator, while ours are placed on low and flat ground, crowded with adjoining buildings, and on a level with the eye of the beholder. We, also, in contradistinction to the Greek (who was enabled, by the dryness of his climate, to leave the centre of his temples uncovered) are compelled, for light and ventilation, to introduce Windows into our edifices, frequently under Porticos; and there stand the columns, presenting a continual obstruction to the admission of Light, and displaying internecine war with the purpose and intention of the windows. Extensive covered ways in places of public resort, as well as at the entrances of private mansions, are, in our cold and rainy climate, almost indispensable to comfort and convenience; which would also require that carriages should be able to set down passengers clearly under them, without the trouble and inconvenience of driving in, (an arrangement admitting only of occasional adoption)— and columns are invariable found to interpose and defeat the object.

Many thousands of pounds annually would scarcely suffice to pay the rental value of the ground alone which (in many of the most crowded thoroughfares, to the annoyance and serious inconvenience of the public) is occupied by Columns and Piers in the British metropolis; and, except to serve the necessities of a misapplied construction, not a single utility can be named as resulting from their introduction. Yet, in Nature, which, as the poet truly says, is "at once the source, and end, and test of Art," Utility is the invariable accompaniment, or rather, the primary concomitant of Beauty. A colonnade of masonry, however elevating and satisfying to the mind of the beholder—when applied to purposes possessing some dignity of association, and not found incompatible with the requirements of convenience—is unquestionably a noble and beautiful object. But apply it—as it is not unfrequently applied, for the sake of the utility of the *roof*, and a mistaken idea of excellence in architectural effect (and of this the late Quadrant Colonnade in Regent-street formed a striking example)—in front of a line of shops, presenting an almost uninterrupted continuity of glass and metal, and it becomes a very caricature of its venerable and sublime original. A masonic, or would-be masonic, colonnade of classic architecture, projecting from a basement wall of sheet-glass, lined with millinery, children's toys, ladies' trinkets, and gentlemen's snuff-boxes, which constitute the usual contents of modern shop-windows on such occasions—even had it every perfection in *Utility* to recommend it—could excite little other feeling in the mind of the true lover of antiquity, than that of regret at the lamentable inconsistency of the appropriation, the violation of truth in classical association, and the degradation of forms and arrangements so originally worthy of veneration and regard. But when the question of Utility is brought into consideration,—when the inconveniences of the inhabitants and disparagements to business, occasioned by obstructed Light, obstructed Space, obstructed View, deficient Ventilation, accumulations of dirt, annoyance of carriage visitors, and various other evils are taken into account—it is almost impossible, after all the care, learning, and expense bestowed on their production, to view these arrangements in any other light than as Nuisances. Yet beauty, elegance, and grandeur ought not to be dispensed with on occasions of this description, whenever means can justly be found for their exhibition. It is ill-becoming in a nation so distinguished by commercial supremacy, to admit of mean and sordid arrangements in application to its purposes; and to continue, as heretofore, destitute of a style of art which may reconcile the supply of the before-mentioned qualifications with the imperative demands of commercial utility and convenience.

It may be observed, justly, that a well-lighted and well-ventilated covering to the public footpaths in places of business and general resort is most highly desirable; that it would be very pleasant and comfortable for ladies to alight from their carriages on a showery day, and promenade in front of a line of gay shops on a clean and dry pavement; that it would save the annoyance of dripping wet umbrellas jostling against each other, and continually in danger of breaking the window glass; that it might supersede the unsightly effect and continual trouble and expense of canvass blinds, usually vieing with each other in ugliness, or producing this result from their incongruous forms and proportions, and when a shower comes on pouring streams of dirty water on the unfortunate passengers; and would be equally advantageous as presenting a cooling shade from the sun in hot weather. All these are important considerations in the economy of public convenience and private advantage; and the attainment would doubtless justify to some extent a sacrifice of taste if it were really necessary; but there is obviously no necessity for any such sacrifice as seen in the employment of columns for the support of roofs of this description. A design, accompanied by sectional and detail drawings and estimates, was submitted by Mr. Pickett to the Commissioners of Woods and Works, in June, 1848, and previous to their introduction of the Bill for removing the Regent's Colonnade, substituting for the columns of the Quadrant the principle of suspension employed in the construction of our iron chain bridges. This design provided a light, elegant, and well-ventilated roof, composed of a series of domical iron frameworks (one to each house), filled in with thick semi-opaque and partially figured and tinted glass, —the whole presenting an enriched, but chaste and elegant effect, entirely relieved of every obstruction, even that of the street lamp-posts—the lamps being suspended from the extremity, and forming features in the design.*

A further and striking instance of the unsuitability of the ancient and commonly employed styles of architecture to the necessities and demands of commercial business, is presented in the inconsistent and discordant effect of shop and office fronts, necessarily composed of large sheets of glass and slender metal supports and framings, forming the basements of houses, the superstructures of which are of the heavy and massive proportioned forms of masonry or brick-work thrown into masonic forms. The broad piers, the small and hard-outlined windows, the heavy cornices and other features, and the dingy, monotonous, if not filthy colour, which brick and stone are so rapidly found to assume in the smoky atmosphere of cities, altogether furnishing the most palpable contradiction to the proportions, quality, and frequently gay colouring of the base. The effect of these crushing and overpowering superstructures on the minds of persons unaccustomed to the inconsistency, might be instructive as well as interesting. A lady, well known to the writer, a native of Scotland, on visiting London for the first time, found much difficulty in suppressing her fears sufficiently to enable her, not only to enter, but even to pass the houses, which she graphically described as "having all their lower parts cut away and standing upon nothing,"—a remark not only applicable to cases wherein the original basement of brick or stone has been substituted by a shop-front of glass and metal, but to the majority of those of which the design throughout has emanated from accredited and experienced architects.

---

* The expense of the whole of the constructive as well as decorative Iron-Work in question (and which formed the entire material of the construction—glass, paint, &c., excepted), including the domed framings, ornamental suspension chains, and standard supports for insertion in the brick walls, was carefully estimated by Messrs. Bramah and Prestage, of Piccadilly, at the sum of sixty pounds for each house or compartment, averaging a superfice of supported roof of nearly five hundred square feet; an expense considerably less than half of that which has been subsequently incurred in the erection of heavy stone balustrades over the incongruous and fragile looking basements of glass, wood, and metal. This, with a series of other designs by Mr. Pickett, in illustration of his system, during the present and last season, have been approved for exhibition by the Council of the Royal Academy, but subsequently returned to the artist, under plea of want of space to do justice to his talents.

The want of a style of art in building, harmonious throughout, with the necessary character of shop and office basements, and which a system of metallic architecture can alone supply, is further evidenced in the effects of scarcity and enormous value of ground (in good localities in cities), and which frequently compels the devotion of the whole of lofty houses to the uses of business. In such cases, well-lighted saloons are equally desirable in the upper floors as at the basement. A striking instance of the obvious inconvenience, as well as offensive appearance of the common forms, on occasions of this description, may be noticed in the premises of Messrs. Rippon and Burton, corner of Newman-street, Oxford-street, especially at night, when the long lines of basement present a continuity of light and lustre, while the windows of the superstructure, devoted also to the exhibition of metal goods, have nearer affinity with the loop-holes of an embattled castle, into which the dread of meeting an ensconced enemy would forbid the passenger to look.

In Domestic Architecture, the union of utility with beauty is equally, if not more, indispensable than in the arrangements of public buildings, because it is in domestic edifices that the most continuous and most permanent effects upon health and convenience are exemplified. In this (or rather in the application of ancient orders and styles to domestic purposes, for we have no domestic architecture), the heavy surmounting cornices and entablatures, almost indispensable to the completion of a good design, whether in the Grecian, Roman, or Italian styles—and which usually form a screen to the upper tier of windows—are exceedingly objectionable in a really architectural point of view, since internal comfort and convenience are on such occasions entirely sacrificed to the production of external effect. In the greater part of our club-houses, and the architectural mansions of the nobility, in the series of official residences forming the wings of the new British Museum, and many other instances, these broad and heavy cornices form a solid prison-like wall, running up immediately in front of the windows of a continuity of apartments, obstructing light, obstructing ventilation, annihilating the external prospect, and converting those which, under a different system, might be among the most cheerful and airy apartments of the building, into little better than dungeons. Lavish expense is frequently bestowed on the external decoration of these parts of edifices; and to those who reflect upon the requirements of the human constitution, they appear but "as whited sepulchres," made showy to the eye, for the purpose of concealing or causing a forgetfulness of their inherent deformities.

The necessity, also, which is found to exist for the erection of temporary screens or coverings within and beyond the porticos of public buildings, as witnessed at the Royal Academy, Mansion House, theatres, concert-rooms, and many of the private residences of the metropolis, for the purpose of protecting the company visiting those places from the weather—a convenience which architecture should legitimately supply—furnishes another proof of the anti-social and anti-domestic, as well as anti-commercial character of the established forms; while the rapidly increasing number of similar purposes for which the art is demanded, calls loudly for the application of forms and arrangements adapted to the nature and character of the objects to which they are devoted, and calculated for the attainment of beauty, in accordance with the requirements of an enlarged and comprehensive utility.

In application to the important purposes of Religious Worship, the styles of art in common practice are equally objectionable, in respect to convenience and economy as to the associations and formularies with which their origin is connected. Deferring for the present the consideration of the two former points, we may remark that the circumstance of Christian congregations assembling in edifices, the counterparts of which were originally devoted to the idol worship of antiquity, cannot be viewed as other than an unhappy coincidence, and exhibits an inconsistency and disregard of historical influence on the mind and feelings, which little short of the utter impossibility of attaining to anything less objectionable, should be allowed to tolerate. This feeling has of late years become so prevalent, that the current appears to have set in in the opposite direction; and Gothic art (which only three centuries since was almost banished from the service of the Church of England and its various dissenting offshoots, in consequence of its intimate relationship with the monkish superstitions and formularies of the middle ages) is now attempted to be installed into the ascendant. Many of the churches recently erected in this style, even in our metropolis and its immediate environs, exhibit specimens of barbarism and ugliness, not to be extenuated even in the darkest of the dark ages which produced them. It is commonly attributed to deficiency of funds that structures of this character assume so objectionable an appearance. But to those who understand, from practical experience, the real economy of *Beauty*, as manifested in its most essential principle, *Form*, the extravagance and waste incurred in such erections is as offensive to reason and justice as the violations of taste which they exhibit.

A better acquaintance than heretofore with the physical constitution of man, and his connexion with, and dependence upon, the elements surrounding him, as well as the almost innumerable refinements consequent upon an advancing state of civilization, has already created, and is still continuing to create, the necessity for various arrangements in connexion with art, science, and manufactures, in application to building, which were altogether unknown or unthought of during ages past; or were, to a great extent, rendered unnecessary by the more genial and equable climates in which the several styles of art in common use attained their highest excellence.

Among the most vital and essential of these—and the importance of which cannot be too highly estimated—are Ventilation and the proper disposition of Warmth in buildings required for the congregation of large numbers.

The custom of employing solid walls (a consequence of the perpetual use of brick and stone) presents a most effectual barrier to the attainment of these advantages. Since the inlet of fresh air so as to avoid the injurious effects of cold draught on the persons assembled, and the outlet of the atmosphere vitiated by respiration—necessary to the maintenance of wholesome temperature, is thereby rendered almost impossible, not only from the opacity of the walls, but the total absence of any single feature in masonic architecture having ventilation for its object, and of a character adapted to the union of beauty and harmony in effect with the necessary transmission of atmosphere. From the same causes the proper application of hot air and steam for the purpose of warmth is likewise impossible, as the non-conducting density of the walls compels the introduction of the heated pipes and apparatus within the hollows of the floors and ceilings—the most injurious and unhealthful position in which heat can be conveyed to the human body.

The absence of architectural provision for external features of ventilation, is illustrated in the hideous appendages for its accomplishment recently erected on the roofs of the Sessions House at Newgate, St. James's Palace, some of the theatres, &c.; while the insufficiency of common forms and brick chimneys for the avoidance of the nuisance and unhealthfulness of smoky apartments is obvious in the almost universal super-addition of metal pipes and cowls, presenting every exuberance of deformity and ugliness, and this at the point of sight most essential to the exhibition of good effect.

The cause of these, and many other evils and deficiencies of common practice, is the *unsuitableness of the forms* hitherto prescribed as proper to architecture, to the nature and real economy of a material daily becoming more and more indispensable to sound and efficient building, and to which we are already indebted for a greater number of the conveniences and comforts of life than to any, or probably all other materials, put together.

Manufactured iron, in sufficient abundance for the general purposes of building, was altogether unknown to the ancients, among whom the classic orders and styles originated—as also to the middle ages—during which the varied and important innovations of gothic architecture were effected and worked out. It is only within the last seventy years (through the industrious agency of advancing science) that cast, or even malleable iron, has been found to attain an effective and tangible position as an available material of building. During this time, viz., from 1780 to 1842, Art—whether in design or invention, or the elucidation of philosophical principles—had done nothing whatever for the efficient and systematic development of its peculiar properties and economy. Iron application in architecture (properly so called) has been limited to simple substitution for timber in the concealed parts of edifices, and to the formation of columns and other features of masonry,* in simple substitution of stone, the enormous bulk and apparent opacity of such forms rendering them most inconsistent, and unsuitable to the nature and economy of iron.

This dearth of art in respect to metallic powers is not peculiar to England. In Prussia, Germany, France, and other countries, iron, merely on account of the cheapness and facility which it offers, has been employed for church towers and other analogous works, but only in imitation of the forms of masonry, which in many instances have necessarily to undergo the most offensive modification, in the reduction of their original and proper proportions, to meet the vastly additional strength of the material, and avoid the most extravagant waste in its use. The deplorable deficiencies of architecture in this and other respects, and the contrast of its anomalous condition to the spirit of progress and improvement so manifest in almost every other department of practical science, has long been observed and descanted upon by writers and critics upon art, as well as the heads of academies and universities, in promulgations from professional chairs. Instances peculiarly demanding improvement, or decided alteration in practice, have frequently been pointed out;* but it was not until the year 1844—when a patent was taken out by Mr. William Vose Pickett, as the discoverer and inventor of a distinct order of Forms in Architecture,† and subsequently in 1845, when a work was published by Messrs. Longman, entitled, "A New System of Architecture," by the same (two papers being read by Mr. Pickett, and illustrated by elaborate models, at the evening meetings of the Society of Arts)—that any definite or specific principles and means were set forth, by which the powers and capabilities of IRON might be effectually and systematically developed.

---

* The Doric columns of the late colonnade in the Quadrant, Regent Street, were of cast iron, and the causes which led to their removal are sufficient to shew that no advantages of a material will avail, if the forms in which it is applied, are unsuited to the required purposes.

Since that period, the theory and artistic details of the system have been more clearly and fully set forth in a series of 12 papers, published in "The Fine Arts Journal" in 1847, and in courses of Lectures delivered in the metropolis and elsewhere, as likewise in numerous designs and illustrations, with sectional drawings, &c., by the author.

Of the economy and advantages of Iron it is unnecessary here to speak. Its extensive employment as a substitute for timber in ship-building, its vast and daily-increasing use as a subservient agent in the operations of building and civil architecture, the more independent application of its peculiar and superior powers in the construction of suspension bridges and numerous other works, as well as the evidence of its invaluable properties as an underground agent, presented in its universal application for gas and water-pipes,—being amply sufficient to establish its inherent pre-eminence over every other material as a primary and independent constituent of architecture, even though its suitability for the refinements of ornamental form were of far more limited character than is actually the case.

---

* The acknowledged condition of the art on the part of professional authorities, may be inferred from the fact that in 1842, the Institute of British Architects (which includes amongst its members many of the most eminent practitioners throughout Europe and America), offered their annual prize for an Essay 'On the effects which should result to Architectural Taste with regard to Arrangement and Design, from the general introduction of Iron in the construction of Buildings.' The total inefficiency and practical worthlessness of that to which their medal was awarded (notwithstanding the general correctness of its author's views as to what was desirable *should* be done) is fully shown in the 4th paper of series in 'Fine Arts Journal,' 1847, by William Vose Pickett; as also in 'New System of Architecture,' by the same, Longmans, 1845.

† In the autumn of 1842, as also during the year 1843, the Royal Commission of Fine Arts, the Royal Society, through its President, the Royal Academy, the Society of Arts, and the Board of Trade, were respectively addressed on the subject; but in consequence of their expressed inability to meet the requirement of the author for protection or patronage in his endeavours, the principles of the system were not at that time divulged.

The very partial extent to which slate, in large slabs, has been commonly applied to analogous purposes, renders the value and economy of this material infinitely less known. The exceeding cheapness of its production, combined with the beauty of its texture, its strength and imperishable durability, is, however, daily continuing to recommend its use for an immense variety of purposes, wherein simple utility and rigid economy are the only objects to be attained; while the facility with which it admits the action of the saw, the plane, and the polishing tool, the operation of the turning-lathe, and other instruments for the production of superficial ornamental form (in each of which respects its working power is greatly superior to that of every kind of timber)—independently of the beautiful and enduring process of enamelling, by which its surfaces are made to vie with the richest porcelain—is at once sufficient to establish it, not, it is true, as a primary element, but (if properly and efficiently applied) as a most invaluable auxiliary constituent of architecture.*

---

* Mr. Magnus, the proprietor of the Pimlico Slate Works, and patentee of a most superior method of enamelling in colours, gold, &c., and where specimens applied to a great variety of purposes may be seen, is now offering the supply of slate slabs (planed on both sides), of from four to seven feet long, and of proportionate width, at three-pence halfpenny to five-pence per foot.

It is well ascertained that slab slating can be obtained of almost any size and thickness that could be required—forty feet by thirty feet, and twenty inches thick, having, in one slab, not unfrequently been realized. Peculiar and expensive machinery is, however, requisite in order to procure a regular supply of slabs of colossal magnitude, and owing to the very limited demand hitherto existing, enterprises of this nature have not been deemed to offer a sufficiently sure and profitable return for the capital necessary to be embarked. With regard to the inexhaustible character of our natural supply, no doubt whatever can exist.

In the Idris Quarry, near Lake Arren, Minfardd, Merionethshire, one vein alone is found to measure 1200 yards in length, and upwards of 100 yards in width.

In a recent publication of Mr. Joseph George, an inhabitant of North Wales, much conversant in these subjects, who has been many years practically

An analytical examination of the primary principles or elements of Form, upon which the ancient styles and orders are founded, proves them to be invariably adapted to the properties of stone. These are found to constitute the common and universal basis of each and all of them, notwithstanding the differences of the results obtained by the varieties of application and development.

The first of these elementary principles relates to the construction of walls, and consists in the arrangement of solid (cubical) blocks, one upon another. The second principle of the masonic arts affects the production of ornamental form by means of carving on a surface. The third consists in the support of projecting and other roofs on columns and piers; and the fourth (although in a less degree affecting mechanical arrangement) is exemplified in the prevalence or predominance of straight-lined and angular forms.

The principle of mural construction by the piling of solid masses is at once so obviously contra-distinguished from the nature of iron, slate, and timber, that the necessity of adopting other means whenever these materials are employed, must, by the most indifferent observer, be immediately recognised.

In the application of iron to the ornamental purposes of architecture, it is evidently indispensable that the process of casting be resorted to; and if the effects produced by the carv-

---

engaged in iron manufactures, and has himself invented an exceedingly simple and ingenious method of building houses, for humble purposes, composed entirely of slate slabs, in iron framings—and which he states himself able to accomplish at a *saving* of *one-fourth* of the cost of *common buildings*,—it is stated that, "In this last-named district (*i. e.*) North Wales, there are at least 2,500 square miles of one mass of slate strata, and openings have only taken place where Providence has made its goodness and quality so prominent as to force itself into notice. I find (says he), from inquiry of a proprietor of one of the largest quarries, Aberllefelyn, that, although so extensive and productive, it did not cost a single shilling to open it (the very first piece taken out being saleable); and this, with proper care and judgment, might be the case in the whole district, the situation of the mines offering this advantage in so many different places. It has hitherto been considered that no vein of slate could possibly pay for working, unless it were of that fine and silky-like quality that will split to the greatest nicety, or into the thinnest sort of slate for covering houses, &c., as nothing else could be found to pay its way; so that the slabs we get in London and elsewhere, although so fine in quality, and of so large a size, are nothing more than of secondary consideration to the quarry proprietor, being such as were formerly turned aside for want of a demand. Many quarries in which the slabs are not of the fine silky texture before described, although immensely large and good in quality, have been considered failures, the slabs being so large they could do nothing with them, and the quarries became abandoned. This is the case where they are short of the convenience of roads, water-power, and machinery, and many are to be had for little or nothing. A similar abundance of natural supply is also found to exist in the counties of Devon, Somerset, Cornwall, and several others."

ings of masonry are attempted by this process, they are necessarily less bold and effective, and altogether inferior in quality, by reason of the impossibility of relieving the model from the sand, when the undercutting, so necessary to prominent and well-carved form, has to be imitated. The result of such attempts to follow out this principle of masonry, is, therefore, to exhibit iron in the light of a decidedly inferior material for ornamental purposes. And yet the slightest consideration of the innate qualities of iron, and the vast variety of ornamental purposes to which it is constantly applied, from grand and massive interstitial gates and screens—(modern examples of which are witnessed at Hyde Park Corner, the arch at Buckingham Palace, the Marquis of Westminster's in Grosvenor-street, &c.*)—to the lace-like transparent brooches and ear-rings of the bijouterie of Berlin, must render obvious the real superiority and vastly extended powers of this material for the purposes of ornament, and prove the second elementary principle of form of the masonic arts entirely inefficient for the development of the powers and properties of iron.

The third—namely, that of supporting roofs and porticos by the agency of columns and piers—(though perfectly capable of being applied to iron, and realizing in the application greater cheapness and durability than is attained by other materials)—furnishes no criterion of the constructive powers and economy of the material. The suspension principle, illustrated in chain bridges (of which the bridge at Charing Cross, as a work of mere mechanical science, presents an effective example), is that alone which can really develop those properties and superior powers of iron, by which it is distinguished from stone; and therefore it is that the third elementary principle of masonic architecture, equally with the first and second, is inadequate and inefficient as a practical exponent of the advantages of this material in the art.

In respect to the fourth, or last named principle of elementary form in masonry—namely, that of the general determination of parts and features by straight and angular outlines—two points of consideration present themselves; the one relating to utility—as strength, durability, facility in execution, &c.; the other, affecting the general production of beauty.

Here, not to anticipate another portion of our subject, we must content ourselves by referring to the observation and experience of the reader in proof of the following facts:—

---

* Each of these specimens of casting are the production of Messrs. Bramah and Prestage, the parties who supplied the estimates for, and were willing to undertake the erection of Mr. Pickett's Suspension Portico for the Quadrant. (See page 10.)

1st. That any elongated piece of metal (of which a poker offers a familiar example, the object being to obtain the greatest amount of strength with the smallest weight of metal) is far less liable to bend or break, and is therefore stronger, from the introduction of occasional swellings or annulets, than if the instrument, having the same quantity of metal, presented a straight-lined rod.

2ndly. That receding angles—such, for example, as occur in the inside of wooden casks, or iron water-cans, present the first and readiest points of corrosion and decay.

3rdly. That a pliant piece of metal—say, for example, a yard of wire or iron hooping—is with much less time and trouble made to produce a circular than an angular form, as well as being stronger and much less liable to burst. That in the process of casting there is certainly not more, but rather less trouble in the production of non-angular than straight-lined forms, and that the junction of such forms for simple constructive purposes, is not necessarily attended by additional trouble or expense. While in reference to beauty, we have not only the authority of the celebrated theory of Hogarth in favour of the simple element of the curved line, but the example of Nature, in the most excellent of her productions, to make manifest the supremacy of the combination of such lines in the production of the beautiful.

Another consideration, irrespective of that of Form, but which not immaterially affects the efficiency of the masonic styles and practices of architecture in application to Iron, is one connected with the treatment of surface; or in other words, the application of coatings, whether of paint or other substance, for the purposes of preservation and effect. In the masonic arts, practices of this description are merely tolerated, or resorted to as necessary evils, consequent upon the trying nature of our climate, and the great prevalence of smoke from our extensive use of coal—destructive influences which, even upon the best qualities of stone, almost demand the interposition of some external and repeatedly applied medium, to protect the material, and preserve our edifices in a somewhat decent state of cleanliness. The equanimity of the Greek and Roman *originators* of the arts *we copy*, was undisturbed by considerations such as these; and since the appearance of clean and uncorroded stone and marble is certainly not improved by the addition of paint, it is not surprising that the operation of applying it formed no essential part of the arts derived from nations of antiquity. But the very different properties of the material of iron, its tendency to oxidation, and the dull and heavy colour it possesses, imperatively demand some external application for the combined attainment of utility and beauty in its use; and, therefore, any style or system of art, of which painting or other equivalent process does not form an essential portion, cannot be other than inadequate and inefficient in adaptation to the properties of iron.

It will perhaps be remarked by the reader, that "Iron is frequently employed for the purposes of building, in forms very different from those which prevail in masonry;" and we will therefore venture some observations on the common employment of this material in the formation of verandas, balconies, conservatories attached to dwelling-houses, and constructions of a similar character.

In reference to features of this description, it must be confessed that amidst many which are very objectionable, specimens are occasionally to be found which not only exhibit consistency with the nature of iron, but a considerable degree of positive and intrinsic beauty. In architecture, however, as in the highest and most complicated works of Nature, two distinct properties of beauty are found to exist,—the one is "the positive," or beauty of individual parts; the other (and this by far the most important in respect to architecture) is "the relative beauty" of individual parts to each other, and their connexion in an uniform, consistent, and harmonious whole. Now, it must be perfectly evident to any observer of Nature, that harmonious relationship of parts is the most essential concomitant of beauty and perfection, in all constructions which involve plurality and variety of parts. No one could imagine the legs of the elephant to have as good an effect if surmounted by a body of the proportions of the race-horse, as by the huge and solid mass which Nature designed them to sustain; or that the delicate head and neck of the giraffe, or the soft and downy wing of the ostrich, could be transferred to bodies of an opposite character to their own, without the most offensive results as regards the laws of proportion, fitness, and just relationship of parts; without which, excellence, in any complicated production, can never be attained.

In respect to verandas (those useful and most agreeable appendages to domestic structures), it is easy to perceive that a large amount of endeavour has been unsuccessfully made to produce harmonious effect through the junction of the discordant elements of stone and metal (we name stone, because although brick and cement are most frequently employed for houses having verandas, they are invariably put into the forms of stone architecture). If it be inquired, "Why are the elements of stone and metal necessarily discordant?"—we reply by reference to the distinctions inherent in their nature, which demand totally different principles of construction, and a different order of forms in decoration, rightly and satisfactorily to express the properties of either.

But it may be said "That each of these materials might be subjected to laws of form adapted to their respective natures, and be thus combined together in a work of architecture." True, respective parts of opposing character *may* be and *are* continually so combined; but where is the *law* that should govern the entire work—and by which alone relative beauty can be obtained—to be derived from? The stone will say, "Because I am the primary material of the edifice, my nature shall be the law which shall control the whole;" while the metal replies, "Because I am the superior material, possessing greater power and capacity than stone, and moreover.am employed for those features of the structure most prominently presented to the view; the forms and proportions adapted to my nature and properties shall regulate and determine the whole." And so, between the complicated claims of the opposing elements, relative beauty, and consequent unity and harmony in effect, is sacrificed.

The most prominent and conspicuous feature of the edifice (as a veranda most frequently is) expressing form adapted to metal (and this usually of thin and paper-like proportions), and the primary and integral parts and surfaces of the building adapted to stone, are therefore left to display internecine war one with the other. And, notwithstanding the innumerable occasions on which the experiment has been tried, and the partial success which may sometimes effect the production of positive beauty in individual parts, no law has yet been derived—nor ever can be derived—from the nature of either, or the combination of both, which can reconcile their inherent distinctions, and render possible the attainment of relative beauty by their conjunctive expression.

On reference to the best examples of classic architecture, the portico is found to dictate the law to, and influencing the forms and proportions of, the whole edifice; or rather, the necessary form and integral character of the primary, has determined the general character and disposition of the extraneous construction. Solid geometric mass is exhibited in the blocks of which the walls are composed, and forms presenting geometric quantity are the harmonious characteristics of the portico.

In like manner, verandas, which are of equivalent use and prominency, should dictate or express the character of the primary arrangements of the building of which they are made a part. This appendage, in conformity with the economy of metal, is composed of forms the decided reverse of those which exhibit geometric quantity; and, in obedience to the analogous principle established in the antique arts, can become a consistent and suitable appendage to none other than constructions in which solid body or quantity is abandoned (as in the walls of a wooden house, and necessarily so when iron is employed for like purposes),—or at least to none other than edifices which, in their external effects, are rendered expressive of such a principle of construction, in a manner analogous to that in which cement is commonly employed to imitate the forms of masonry.

In suspension bridges, as hitherto erected, another instance is presented of the abortive effect of the union of the forms of masonic architecture, as exhibited in the piers, with the enlarged and peculiar powers of iron, so strikingly manifested in chain construction. What masonic architecture has to do with such erections it would be difficult to determine, since neither Greece, nor Rome, nor Italy, amongst the ancients, nor any of the European nations, during the development of Gothic architecture in the middle ages, have left us any type or semblance of an iron suspension bridge. It is to the industry and energy of modern mechanical science, during the present century, that we are indebted for these economical and expressive structures. And, as if to serve the purpose of a powerful illustration of how lamentably far behind the spirit, endeavour, and accomplishment of the present age, the art and science of architecture still remain, it has hitherto found no other forms for the *piers* of bridges of this description, than those it is so complacently accustomed to dream over in the comfortable easy-chair of ancient physical example.

So great, indeed, is the extent to which the powers of invention have been suffered to lie dormant in the practice of architecture, that it has become a question whether it is justly entitled to be considered as an art; for the imitation of formative example in architecture is not fine art—and the composition and re-arrangement of features long since brought to perfection, and the patterns of which are as common as the characters of the alphabet, have no reasonable claim to such distinction.

The effect of the limitation of the forms of architecture to such as are suited to the qualities of stone, is to perpetuate an expensive and tedious process of building, and shut out from general attainment many important advantages in utility, cheapness, and beauty, which the employment of an order of forms, philosophically and practically adapted to the nature and economy of iron, slate, and timber, would unquestionably occasion. Among these, the more prominent are—*facility in erection* (and this at all seasons of the year); *portability*, which includes an easy power of taking to pieces and removal without injury and destruction—the consequence of which is, a *capacity for exportation; durability*, by which society would be relieved from the continual expense and trouble of repairs consequent upon the intricate and perishable character of common buildings; the perfection of ventilation, warming, and many other utilities and conveniences, impossible of attainment by any application and extension of masonic principles, combined with the production of a distinct and superior order of beauty. And this, as experience will prove (when fairly and properly developed), at considerably less outlay than attends the common practice of the arts of masonry, and the application of their primary forms and extraneous features to the common purposes of common building.

The nature and innate qualities of Slate render it infinitely better calculated to resist the effects of climate, and maintain a lengthened state of preservation, than any description of sand or limestone. But from the circumstance of Nature presenting us with stone in massive blocks, and slate in comparatively thin slabs, it is obvious that while the former possesses a constructive and sustaining, the latter presents little other than a covering or enclosing power. The idea of a solid wall of slabs of slate is almost as absurd and impracticable as a solid wall of iron or timber. The material offers itself as a most invaluable substitute for iron plates and timber plankings, but not for blocks of stone, the thickness of which it fails to realize, and hence the necessity for an order of Forms adapted to iron, in order to render the advantages offered by slate available and beneficial to society.

Even were the first principle of the masonic arts to be abandoned (as is invariably the case when iron or timber houses are erected), and slate enclosure, in conjunction with iron or timber supports or framings, were attempted for the walls, yet, though slabs might easily be made to assume the superficial forms of blocks of stone, and, with the aid of paint, some imitation of their appearance, the massive and block-like character of masonic features renders them totally unfit for application to a material of such nature. And, therefore, in the absence of a system of architecture providing a different description of ornamental form, as well as of primary construction, from that which prevails in common practice, the benefits to be derived from the employment of slabs of slate must continue unavailable—except in application to paving, roofing, and various minor purposes. With regard to the application of Hollow Brick or tile Pottery, (of which ever-variety of form may, by the aid of machinery, be produced at exceedingly small cost,) the common forms of architecture present a series of difficulties, highly destructive to the economy as well as beauty of the application. The imitation of stone or cemented surface, especially in the instance of plain buildings, necessarily demands perfect facial smoothness, and straightness of junction lines, while correct and level forms in mouldings are equally indispensable, to avoid absolute offence to the eye. Each of these objects are almost impossible of attainment in the conjunction of any extended number of pieces of pottery; since, from the various degrees of density of the clay, and of the heat to which it is subjected in the process of manufacture, it is continually liable to warp and become uneven—a contingent precisely similar to that affecting cast iron, and demanding an order of forms adapted to meet this difficulty in preparation and erection.*

It may still be unknown to many of our readers, that science has at length accomplished the valuable and important work of rendering timber un-inflammable, and, at the same time, impervious to wet and dry rot; the entire process not necessarily adding more than a small fraction to the original cost. This discovery, the efficiency of which has been practically tested and proved,† has the effect of at once exhibiting timber in the light of an infinitely less objectionable and more efficient material than heretofore, and one particularly applicable, as a cheap substitute for iron, in the construction of skeleton framings for walls and roofs, admitting an external enclosure of slabs of slate,—the interior being lined either with the same, or fire-proof lath and plaster.

But, notwithstanding the economy to be obtained by the use of this incombustible and anti-decaying timber, for purposes of the above description, as well as for the interior fittings of houses, the expensive process of carving forms in timber for the purpose of architectural ornament—combined with the fragile

---

* In a MS. volume by Mr. Edwin Chadwick, of the Health of Towns Commission, on the use of hollow bricks, the advantages to be derived therefrom, as compared with common brick and mortar, are stated to be greatly increased: dryness in the walls; greater facility and cheapness in construction; superior warmth, and consequent saving of fuel to the inhabitant; saving of space; less transmission of sound; and a power of glazing and permanently coloring the surface.—(See No. 324 of "The Builder.")

† At the wharf of the Timber Preserving Company (Payne's Patent), Cannon Row, Westminster, a model wood cottage may be seen, which has been filled with shavings, set on fire, and exposed to the flames for a very considerable time without injury to the rafters and plankings.

Similar results have been obtained, where a large quantity of highly resinous character of the work, and the receptacle for dirt and wet it necessarily presents when exposed to the weather—renders it highly objectionable and unavailing on such occasions, and tends greatly to increase the demand for an order of forms systematically adapted to the properties of iron in architecture, and calculated to facilitate the use of the latter material, in conjunction with timber and slate, in the practical arrangements of building.

The unfitness and inadequacy of the principles of masonic forms for the development of the economy of iron and other materials, have now been pointed out. It follows that a style of art really adapted to this object must be based upon elementary principles of a totally different character; and to define these is the object of the System of Architecture proposed by Mr. W. Vose Pickett, of which we have now to give some account.

Mr. Pickett shews that the first principle of form to be considered is that which is governed by the construction of walls, composed, not of solid masses, but of a skeleton framing, with a double or single enclosure. The double enclosure forming a Hollow Wall, admitting a stratum of air between the surfaces; or, if occasion require, a filling in of dry sand.

The elementary principles placed by Mr. Pickett next in order, relate to the character of Ornamental Form, as affected by the materials of construction. One consists in the introduction of INTERSTITIAL, perforated, or open cast work of iron or other substance, expressed in variety of feature, and suspended at given distances from the surfaces of walls, ceilings, cornices, &c., by the agency of pins or screws, of efficient and correspondent design. Another, in the expression of LOW RELIEF, or intaglio ornamental form, moulded, cast, or wrought on the surface of the walls, or other parts of edifices.

A fourth principle is illustrated in the application of suspension-chains and tie-beams, secured to the walls or buttresses of build-

---

planks and staves had accidentally caught fire in a building,—the whole interior mass burning with terrific fury,—while the rafters and beams preserved by this process, notwithstanding the immense heat to which they were exposed, did not communicate or extend the flame.

It has likewise been tried in India, and proved a most effectual preservative from the destructive ravages of the white ant; and is found to prevent the attacks of the Limnoria, Teredo, and all other sea-worms.

The process may with equal, and, indeed, greater facility and effect, be applied to the most cheap and porous, as to the hardest and most expensive woods. It is a great improver of the appearance; and causes deal, pine, and other common woods, to admit with ease a very beautiful and enduring French polish, as likewise every variety of bright and glowing tint by the process of dyeing.

ings, as a means of support to porticos and roofs of large edifices in general, without the intervention of columns or piers.

A fifth consists in the general or predominant introduction of curvilinear or anti-angular forms, throughout the primary parts and apertures of buildings.

The sixth and last elementary principle laid down by Mr. Pickett consists in the artistic and mechanical employment of paint, or other available and efficient medium of preservation, polish, and colour.

OF THE FIRST PRINCIPLE.

This, as a general principle of mural construction, is selected as the basis of the new system, from suitability to the nature and economy of iron and various other materials. In its simple application it has no claim to originality, having, in all ages, been employed in the formation of timber houses; and, of late years, somewhat extensively adopted in the construction of iron houses for exportation; although, from the absurdity of copying the ulterior forms and imitating the appearance of common buildings, these constructions have hitherto failed to develop more than a mere fraction of the advantages to be attained through the proper architectural employment of the material.

The principle of hollow-wall construction admits of application in various ways. For example, an iron skeleton or framing with enclosure of iron plates, or a similar one with enclosure of slate slabs: these on flat surfaces are doubtless preferable, as to quality, and considerably cheaper than iron plates. Hollow brick or tile pottery being highly available. Perforated iron lathing or wire net, with a coating of plaster or cement, may likewise form a good enclosure for interiors. Each and all of these appliances are decidedly fire-proof. Nearly equal effects, in this respect, as well as in other peculiar advantages of walls of this description, may, however, be attained by the employment of timber rendered incombustible and undecaying by chemical and atmospheric agency, for the purpose of skeleton-framing, or in the form of common wood lath for the reception of plaster. The process being available at a mere fraction on the cost of raw timber.

In consequence of the main support and strength of these walls being dependent upon skeleton-framing, it is by no means necessary that double enclosures should be at all times employed. For example, in the foundations and cellarage of buildings, in the erection of out-houses, coach-houses, lofts and stables, commercial stores and manufactories, granaries, &c., a single enclosure of slate-slab would, in the majority of cases, effect every desired object, combined with less occupation of space, and considerably diminished outlay; while purposes occasionally present themselves wherein single enclosures would be efficient, not only for use, but for the attainment of grand and consistent architectural effect. An example of this has been illustrated in a design, by Mr. Pickett, for a portable and fire-proof Colosseum, on a scale similar to that in the Regent's Park, London, projected by the proprietors of that establishment, for the purpose of exhibiting the panoramas of London in the cities of Europe and America. The main supports and girders of the framings being, under peculiar artistic treatment, prominently developed in aid of external effect.

The small amount of space occupied by walls of this description, even in the case of superstructures requiring double enclosure, as compared with that of solid walls of several feet, and sometimes yards, in thickness, required for the support of large and lofty buildings, furnishes an important item in the economy of architecture, especially in application to crowded localities and costly ground, where it not unfrequently occurs that more than one fourth of that devoted to the erection of a house is occupied by masses of brickwork for walls and chimneys.

The saving of space in foundations and single enclosed walls, may in general terms be stated at an average of seventy out of seventy-three or four inches; in those parts where the upright beams and transverse girders do not occur, and where these present themselves (say at average distances of from six to ten feet or more, according to circumstances), the projection into the interior would not, doubtless, exceed one-third of the thickness or depth of brick walls; while in the case of hollow or double enclosed walls, the occupation of space necessary for the attainment of equivalent strength, may be stated at an average of one foot to three or four feet thickness of brickwork. Independent of which, the hollow enclosure is at all times available for closets and other uses.

In reference to the question of expense, it must be obvious that foundations and walls of this description would bear no comparison with the cost of the enormous masses of brick and stone work, employed for the same purposes, in common practice.

Portability—facility for speedy erection at all seasons of the year—and capacity for taking to pieces and removal without injury or destruction (thereby enabling houses and other buildings to be, at small expense, re-erected in a more convenient place)—form other and important advantages.

Safety from attacks by lightning is another peculiar advantage resulting from the application of iron: this metal being a conducting agent, by which the electric fluid is quietly and harmlessly conveyed into the ground, without damage to the building. In the 162nd number of the 'Edinburgh Review' is an admirable article "On the Nature of Thunder Storms, and the means of Protecting Buildings and Shipping from the destructive attacks of Electricity," by Mr. Snow Harris. The writer, after furnishing a most fearful account of the destruction of cathedral and church towers, houses, powder-magazines, shipping, and other constructions, by this dangerous element, embracing a most alarming sacrifice of life and property (and of which almost every newspaper published during the summer season furnishes additional proof), observes—

> "Were our houses, powder-magazines, and other structures built of iron, or did they consist of a framework of iron, filled in with brick or stone (slate, of course, being equally applicable), they might bid defiance to the ravages of accidental or wilful fire, as well as to all the lightning of the tropics,—strike where it might, the deadly element would be conducted quietly into the ground. In the meantime, however, we must have recourse to a less useful system of protectors (namely, that of expressly prepared conductors), until advancing knowledge and receding prejudice shall have introduced iron buildings, and iron ships, as well as iron roads and iron bridges."

It is altogether a mistake, although a very common one, to imagine that iron attracts the electric element. It is merely a passive agent, by which the fluid, when surrounding any object, becomes quietly conducted into the ground, and is prevented from doing damage. When a rod is carried up above the summit of a building, it is in order that it may meet the lightning before it reaches the building, and thereby preserve it from the consequences of contact. But that such conductors are incapable of attracting the element is proved from a not unfrequently observed fact, of balls of fire striking buildings in the immediate vicinity of these conducting rods, showing thereby the desirability of increasing the number of these instruments,—or rather of employing iron, the material of which they are composed, to the greatest possible extent in the arrangements of building.

The great superiority of iron houses and other buildings over those composed of ordinary materials, in respect to perfect safety from electrical attacks, as also from earthquakes and similar convulsions of Nature (in addition to protection from the ravages of fire), has indeed been clearly established by the facts attending the use of such as have, for a considerable period, been exported from London, Liverpool, and other British ports, and erected in Jamaica, Demerara, Bermuda, and others of the West India islands, as well as to the East Indies, Africa, and other tropical countries peculiarly exposed to the ravages of thunder-storms.

The obvious and acknowledged security afforded by iron constructions against the devastations of fire, necessarily involves another consideration, which is—modification of the severity of temperature, or mitigation of the heat of summer and cold of winter, an object highly desirable to be attained, and evidently governed by the same laws. This is proved by the analogy of the iron safe, which, if composed of single plates, will, when exposed to high temperature by the action of fire, become red hot, and cause destruction to the contents; while at equal or even greater heat, perfect safety is secured by the application of a second plate, or double enclosure, and the admission of a stratum of air between the surfaces—an infallible test of the cooling power resulting from the latter arrangement. On the other hand, in illustration of the effect of hollow walls in mitigation of cold in interiors, reference may be made to proved advantages in the case of green-houses, which, though only partially composed of hollow walls of bonded brick, have been found, without other aid, to maintain so much higher a temperature than those of solid construction, as to preserve plants in perfect health during winters of greater severity than those in which the same species had, for many years, been destroyed, under the influence of walls of the ordinary solid construction; proving in this as well as the former case, the benefit to result from a stratum of air between two surfaces. It is also worthy of remark, that iron is employed for the purposes of building to a much greater extent in Russia, especially at St. Petersburgh, than in other countries.

In the present acknowledged state of general unacquaintance with the laws of SOUND in relation to building and architecture, the difficulty of maintaining any assertion on the subject is obvious. There is, however, much reason to apprehend that hollow walls, between the surface of which a regular stratum of air is admitted, would possess superiority over those of solid construction, in the condensation of sound originating within the edifice or apartment—and exclusion of that arising from without—the first and most important object to attain. Since the voice of a speaker, for example, would, under such circumstances, be distinctly heard in a much larger edifice, and consequently by a more numerous congregation,—a point materially calculated to affect the real economy of church-building, as well as that of theatres, music-rooms, and places of general auditory. If, however, the result of practical and special test and experiment should prove the reverse of this effect to ensue from the employment of hollow walls, abundance of means are at hand for remedying such an objection, by the use of dry sand, &c., for filling in the spaces.

The second object of attainment in this respect being that of equal diffusion of sound, whether oral or instrumental, is probably somewhat better, though still very imperfectly understood. It is, however, indisputably allowed to be favorably influenced by the absence of columns and similar obstructions in interiors, as well as by the avoidance of angles and angular forms.

A further and peculiarly beneficial result of the introduction of hollow walls is the opportunity thereby presented for the diffusion of warmth throughout public and other buildings, in a manner conducive to the bodily health and comfort of those who visit or dwell in them. The common practice of inserting pipes for the conveyance of heated air or steam under the floors and above the ceilings of apartments, is highly injurious and destructive to the human constitution. To receive an excess of warmth for any length of time, either from beneath the feet, or directly above the head, greater than that by which the body is surrounded, is well known by every reflective and observing medical practitioner, and easy to be proved by personal experiment, to have an exceedingly weakening and disordering effect upon the frame and functions of life. Artificial warmth in buildings, in order to be effectual and healthful, should invariably surround or approach us from the sides. In common solid walls it is almost impossible to accomplish this, because, in addition to the necessity for cutting the wall away, or leaving spaces sufficient to receive the frequently numerous pipes required for this purpose (by which the stability of a structure becomes impaired), the non-conducting properties of stone, and the density of the substance (even though the wall be brick) through which the heat is required to penetrate, renders this the most extravagant and uneconomical mode of application that can in such cases be resorted to. In hollow walls, especially if composed of iron and slate, the greatest facility for the insertion of pipes, as well as for the genial diffusion of heat, is presented; and it is not until such walls are admitted into general use, and such a disposition of warming power can with ease be effected, that the health of the congregations who assemble in large buildings, or that of the inhabitants of houses warmed by processes of this description, can be properly provided for.

In respect to the construction of chimneys, it is unquestionable that iron pipes inserted between the hollow surfaces of walls present a most economical and efficient means for the conveyance of smoke, as well as for the diffusion of warmth. To those disposed to doubt the value of the application, a visit to Messrs. Holmes's shawl warehouse, Regent-street, London, is recommended, where hollow cast-iron pipes, having externally the appearance of Sienna marble columns, are made to perform the office of kitchen chimneys, in addition to that of supporting the weight of the stacks and walls above.

The frightful extent to which the disfigurement of buildings is effected through the miserable necessity for the super-addition of metal pipes to the summits of brick and stove chimneys, presenting every variety of deformity, while usually failing to fulfil their object in the cure of smoky apartments, furnishes humiliating proof of the low ebb at which practical science still remains in respect to architecture. But if (in conformity with common notions) an extraordinary amount of curvature, especially in short chimneys, be necessary for the avoidance of the nuisance of smoky rooms, hollow walls, and iron pipes inserted within them, certainly present the greatest facility for the attainment of this object, as well as for removal of the present causes of offence from the sky-effects of houses, through the incongruous and wretched assemblages of tinker's work, which constitute the crowning ornaments of so large a proportion of metropolitan buildings.

In respect to Ventilation,—that most important but deplorably-neglected concomitant of good building,—it is indispensable that ample provision be made for draughting off the air, rendered impure by the respiration of crowded assemblies; since, if this object be effected, "Nature," which is said "to abhor a vacuum," with very little precautions on the part of the architect, will speedily furnish a fresh supply.

In severe weather, however, it is highly desirable that the air so admitted should previously undergo the process of warming; and hollow walls offer peculiar facilities for pipes and other apparatus for this purpose, as well as for the transmission of the vitiated atmosphere of the apartment through perforations in the wall and communications with the summit of the building. A highly-interesting and philosophical theory has recently been promulgated, respecting the causes which are believed to influence the action of wind. By this it is contended, that in some unknown part of the regions of space a vacuum is created, and that wind is produced by the rushing of the atmospheric air into that vacuum. A valuable hint in the science of ventilation appears to be deducible from this theory, which is, that if a simple machine upon the common principle of an exhauster or air-pump—but of quiet and self-sustained action—were applied between the ceiling and outer roof of churches and places of general assembly, the object hitherto found so difficult of attainment in closely-covered buildings, namely, that of getting *out* the impure air, in order to get *in* a constant supply of that which is fresh and wholesome—might be effectually accomplished.

In addition to the various advantages herein enumerated, as calculated to result from the application of the constructive principle and materials now under notice, may be mentioned the absence of every description of vermin, and the avoidance of the absorption of damp, and its unhealthy accompaniment, mildew, so common in brick walls, especially such as, being underground, have never proper opportunity of becoming dry. The non-absorbent properties of iron, slate, and even of chemicalized timber, render them infinitely better suited than brick and stone work for the accomplishment of the desired object of dryness in building; while, in contradistinction to almost every description of stone and raw timber (within, and on the surface of which, animalcules, as well as vegetable life, are liable to be engendered), iron is wholesome and beneficial to health in its very decay. The common rust from nails, &c., in gardens and other places, being not unfrequently ordered for inward application by medical practitioners; while various preparations of iron are known to have exceedingly strengthening effects on the human constitution.

From these properties, peculiar to this metal, it might be presumed that influences decidedly favourable to health would result, from their general effect upon the quality of the air inhaled within the interior of houses, in the construction of which the material was largely employed.

OF THE SECOND PRINCIPLE.

In treating of a principle of Form in Architecture, the chief object of which is to effect the production of ornament, considerations arise very different from those of the foregoing, which have almost exclusive reference to physical use, or such qualifications of buildings as directly affect the bodily health, and conveniences of life. Since, however, architecture is required to serve other and higher purposes—in the refinement of the moral sentiments through the realization of the beautiful—the most paramount qualifications of such a principle of form is richness and variety in effect, combined with cheapness in production and durability and cleanliness in use.

With regard to the merits of Interstitial or Transparent Form, as compared with that which is massive and opaque from being carved or cast on the surface of a solid body, it may be remarked that it would probably be impossible to produce a design for the one, which could not, with some slight modification, be carried out in the other. It is from the contingent positions and circumstances in which these forms are placed, and the influences which are brought to bear upon them, through the agency of light, and its action upon their peculiar combinations, that the excellencies of the one in comparison with those of the other can be developed. For example, to compare "great things with small," if we take a piece of lace (a fabric in the highest degree susceptible of the beauty of interstitial form), and paste it over a solid body of its own colour, its outlines and configuration will remain the same. Still beautiful it may be, but illustrative of the effect produced by solid and opaque form, analogous to that exhibited in the surface-carved or relievo-ornament of masonic architecture. Again, if the same piece of lace be stretched over a surface of agreeably contrasted colour, the beauty and elaboration of its form will become much more manifest, though still expressive of a solidity coincident with that of a printed or embossed pattern over an opaque substance, rather than of the transparent qualities in which its intrinsic excellence consists. But remove this piece of lace from the substance over which you had stretched it, and place it at a judicious distance in advance of the surface of contrasted colour, allowing the action of light to fall favourably upon it, and the result will be, not only that the beautiful intricacy of its forms will be prominently exhibited, but a super-added, peculiar, highly interesting, and, moreover, entirely gratuitous species of beauty and effect becomes produced, through the varied repetition of its forms and combinations, and the ever varying modifications of the same, in the incorporealities of shadow.

Now, though it might, perhaps, be brought within the bounds of possibility to produce interstitial forms of this description in stone or timber, of proportions, it may be said, delicate enough for the purposes of architecture, yet the brittle and fragile properties of these materials, as compared with the extraordinary strength and tenacity of iron, and similar substances, render the latter the most, if not the only, efficient medium for the practical realization of the effects to be produced by the systematic introduction of these forms in architecture. Moreover, the wall or other part of buildings, from the surfaces of which features of this character are (in this system) suspended, being hollow and interstitial, further justifies this character of ornament, since, in the ancient and established architecture, the ornamental features are correspondent with the wall, each being solid or opaque. But not only is interstitial or transparent form consistent and harmonious with hollow walls, the instruments by which it is suspended from the same are of necessity associated with metal construction; since, from the iron ship of several hundred feet in length, and the iron gasometer of equal circumference, down to the handle of a coal-scoop or candlestick—the pin or rivet presents itself as the expressive medium of connexion between the several parts of which metallic constructions are composed.

Another advantage peculiar to the character and disposition of the ornamental form in question, is its singular power and efficiency for the maintenance of the *Beauty* of *Cleanliness.*

In carved or basso-relievo form,—especially when applied to exteriors, exposed to a humid atmosphere so fully charged with particles of soot and dirt, and embryo vegetable matter, as our own,—it is impossible, without frequently repeated mechanical washing and brushing, to preserve such a state of cleanliness as is requisite to exhibit the lights and shadows of the original work, or to protect the forms in question from the accumulations of filth necessarily engendered within the opaque intricacies of carved form, especially when of rich and bold proportion.

In the metallic interstitial form, on the contrary, as applied in accordance with the provisions described, the necessity for cleansing operations of this nature is almost entirely removed. For, independently of the non-absorbent properties of iron, and the absence of the glutinous and slimy surface occasioned by the growth of minute vegetable and animal life, so almost inseparable from stone, the position in which the various features of this description are placed, in relation to the walls, namely, at a clear distance in advance of the surface, is calculated to effect the continual cleansing and washing of their interstices, through the natural action of wind and rain.

The durability of iron forms, possessing such peculiar advantages as compared with that of the forms and materials of common application in the building arts, must be obvious to every experienced and observing mind. This durability materially affects the conditions of beauty, as well as general economy in the art; a point most amply illustrated by the effects of decay, so almost everywhere observable on stone buildings exposed to the destructive influences of the carbonic acid gas with which our atmosphere is charged, combined with those resulting from the absorbent properties of the material, and which are not unfrequently found to manifest themselves even before the erection of a building is completed; in addition to the great expense attendant upon the work of restoration.

An additional and important advantage resulting from the use of forms of this description is peculiar economy, and the cheapness with which they can be procured. In the use of stone in the arts of masonry, every individual feature is produced by the hand-work and chisel of the artisan, a slow and tedious process, involving great expense in the operation; and provided the quality of its material would admit, one which could only be justified by the necessity of every feature and part being different in proportion and configuration from each other.

The very reverse of this, however, is found infallibly to hold in the case of architecture, since beauty and excellence, especially in those arts deemed nearest to perfection, is invariably the result of continual repetition of the exact counterparts of the same features. On the examination of any good specimen of the anciently derived arts, this repetition of parts will be found to prevail to a greater extent than might at first sight be apprehended. Columns, entablatures, cornices, buttresses, pinnacles, consoles, mouldings, window and door-dressings—in short, almost every ornamental feature—are necessarily many times repeated. Portability is another peculiar advantage of Forms of this description, not only as regards the rapidity with which the erection of edifices may be effected, but the facility with which they may be removed, by simply lifting them from off the hooks, or unscrewing the nuts, as cleansing or any other occasion may require.

But while the principle of form in question has immediate reference to the production of ornament, various occasions will arise in which its application may be rendered of decided practical utility, as well as of beauty in effect. An example of this is presented in the transparent semi-cupolette, a feature altogether original and peculiar to the metallic system, inasmuch as metal is the indispensable material of its composition.*

The utility it is intended to serve is that of a sun-shade, it being an external appendage to heads of windows exposed to strong light and sunshine. Being composed of interstitial or transparent metal work (whether cast iron or otherwise), with an inner lining of brass gauze, it is eminently calculated to check the force of the sun's rays, without excluding the light during dull weather, or rendering the apartment close and unhealthful from the obstruction of air, under the effects of heat—objections which seriously hold in respect to every description of veranda in common use.

---

* Numerous specimens of this feature, and appended to models of various and large scales—one in full size, adapted to use in building—were recently exhibited at the Colosseum, Regent's Park, the Society of Arts, and elsewhere. The practical application of these and all other features of the above description, by which the optical or Protean effects peculiar to this system are obtained, is secured to the author by letters patent.

It is, moreover, calculated to supersede the continual trouble and expense of outside canvass blinds; and being a permanent feature in the external design of buildings, it is always ready to perform its office of a sun-shade without any attention on the part of the inmates. The feature is equally suited to public as to private edifices; since, while serving a similar use, it imparts a bold and imposing effect to the external *façades*, with the addition of exhibiting its decorative and ornamental forms, under the most pleasing effects of light and shade, in the *interior* of the room or building.

In the career of the practitioner in this art, other and analogous opportunities will occur for the accomplishment of the effective union of utility and beauty, through the judicious and artistic application of this principle; of which, perhaps, none will possess greater value and interest than the instruments for ventilation and warming; while a new world of original and beautiful effects, in harmony with these utilities, in the region of abstract ornament, is attainable through the same medium. But since description ever fails to realize to our ideas and conceptions the peculiar graces of composition exhibited in the productions of ancient and established art, it is impossible to order it otherwise in the instance of a new one. The reader is consequently referred to Mr. Pickett's elaborate Designs, and for the full elucidation of the beauty and advantages of this principle when systematically and efficiently applied, to the peculiar and expressive language of the artist-architect—form and colour in building.

OF THE THIRD PRINCIPLE.

In previous expositions of this system, this appliance was described under the head of Artistic Treatment of the first Constructive Principle, by reason of its affecting the external forms and appearance of the surface of walls. But since it presents another and distinct element of beauty from that of the principle last described, and may doubtless be available on other occasions than that of mural decoration, it is more desirable to consider it in the light of a distinct principle of the art.

The hollow wall construction, described as the first principle of the system, and the peculiarly bold and effective character of the interstitial features constituting the second, necessarily demand that the forms comprising the third should be restrained within the limits of very low relief or intaglio, so as to maintain a just and reasonable proportion with the necessary substance of iron plates, slate slabs, or other medium of wall enclosure, and present an effective contrast with the prominent ornamental forms of the second principle.

In reference to the methods of its execution, none of the difficulty experienced in the production of the high-relief surface-carved forms of masonry, by means of casting in iron, would prevail, since all approach to the effect of undercutting is purposely to be avoided. Patterns of this description are therefore calculated to facilitate the clearing of the model from the sand in the process of casting, whether in iron or cement; while the turning-lathe and other instruments are, with equal ease and economy, effectual to the cheap and ready production of this description of form on the surface of slate slabs.

The form and manner in which this principle should be illustrated, must obviously involve the consideration of the character of the external forms and effects proper to be exhibited on the surface of the walls of edifices in the metallic system. In the wall of classic architecture, we are presented with two general methods of treatment,—the one, that of fitting the blocks of stone so close and even with each other as to conceal the junction lines, as witnessed in the entablature and other parts of the Grecian temple; the other, in the development of the outlines of these blocks in the several forms of ashler, presented occasionally in the general mural surface of the same structures, and more prominently exhibited in the subsequent Italian modifications of classic art. From these examples and analogies we may deduce the propriety of concealing the junction lines of wall plates or slabs in some parts of an edifice; and exhibiting or representing them, with various degrees of force and prominency in others, according to the artist's judgment of fitness and beauty in the design.

And since pins and screws are indispensable instruments of security in various parts of similar buildings, it will also be most desirable, because most expressive of the true character of the construction, to exhibit the heads or terminations of pins, &c., on the external surface; subject, of course, to the same discretionary powers on the part of the metallic architect as those which govern the treatment of the plates, and are observed in the practice of the arts of masonry. A peculiar and highly effective method of treatment of the heads or terminations of pins, is provided in the second principle of the System, and is happily illustrated in numerous and very beautiful features of Mr. Pickett's Designs; while that we are now describing is illustrated in the production of pleasing variety in effect, by the disposition of other and smaller heads of pins, in only slight advance of the surface, combined with a due admixture of low-relief pattern, with smooth superfice throughout—after the analogy presented in the use of rusticated ashler in the classic arts, though by no means limited to the same rules of disposition.

OF THE FOURTH PRINCIPLE.

That the suspension principle of construction, forming the fourth elementary principle laid down by Mr. Pickett, is in the highest degree adapted to the powers and properties of *Iron*, as well as efficient for the most important purposes of strength and security—has long ceased to be matter of speculation; it having been practically tested, and its general economy fully proved, in application to far more fearful and difficult erections than are ordinarily found to occur within the range and purposes of civil architecture.

On the examination of a suspension bridge (say, for example, that over the Thames at Charing Cross), the above remark will be fully verified. The great central flat of this bridge (nearly 700 feet in length) is perfectly analogous to a *roof;* with this important distinction, that whereas, in application to a large building, such a roof would be surrounded by and receive considerable support from the walls — it is, in this and similar instances, solely sustained by the power residing *in* and thrown out *from* the exceedingly narrow piers. In this position, maintained at so great a height from the surface of the water (32½ feet at high tide), and exposed to the strong breezes and high winds—of which those coming often with extraordinary force, from the south-west, bear directly upon its sides —it might, by the casual observer, be well considered that a triumph of constructive skill had been achieved. But when to this is added the important fact that the enormous flat of this bridge (call it a floor, or roof, for it is analogous to either) is required to sustain the weight of a multitude of passengers, not presenting a dead and even pressure, bearing equally on every part, but a constant and living motion, ever varying in its strength, and of which every single footfall adds to the amount of force to be resisted: when, further, the exceeding lightness of the forms and proportions, the extreme economy of the material,* and perfect security of the construction, are taken into account; this and similar structures cannot but be viewed with considerable interest and satisfaction, as furnishing proof of the industry and energy of modern mechanical science: while the gross inefficiencies of architecture in the application of none other forms than those of masonry, in the design and construction of the piers of iron suspension bridges, present a humiliating contrast to the genius and energy of the ancients in the invention and practice of their arts, the forms and arrangements of which were adapted to the materials they possessed, and the purposes for which they required them.

Seeing, then, that the application of suspension-chains and ties as a general means of support, is fully adequate to the important and severely tried purposes of large and extensive bridge building, it were perfect folly and inconsistency to doubt the efficiency of similar means as a merely assisting power in the support of roofs to large and enclosed edifices, the walls of which are at all times available to receive a considerable amount of the pressure, as well as to furnish a steady, equal and efficient power for checking vibration, and holding the roof in a firm and unvarying position; each of which objects the suspension bridge is required to accomplish in itself, without any analogous aid to that of walls or pillars down the whole length of both sides the central span. The application of similar means of support in the construction of porticos, and other projecting roofs, must obviously be equally efficient (provided it be effected with judgment and proper precaution), when a moment's reflection is given to the fact, that iron beams of every required strength, whether for vertical or horizontal use, are frequently cast in one piece to a length of fifty or sixty feet and upwards; and that means are likewise found (as in the horizontal beams of the suspension bridge) to effect the junction of the ends of these masses of metal, so as to secure an equal, or even greater, amount of strength at the joint than elsewhere.

The economy attendant upon the application of this principle in the construction of roofs to buildings (other than that affecting the peculiar utilities and beauty to be attained thereby), will be found chiefly to consist in the saving of strength in the walls, when applied to edifices of moderate dimensions, and the saving of internal support, and the consequent expense of columns, piers, and arcades, in structures of a size exceeding the possibility of sustaining the roof upon the outer walls alone. For example, in the former case, in Exeter Hall, Strand (as likewise in many newly-erected churches in the classic style), the roof is supported entirely upon the outer walls. But then these walls require so large an amount of additional strength in order to sustain the weight, and resist the outer thrust thus put upon them, as to render this, though by no means architecturally effective, a very expensive mode of construction.

---

* The whole of the iron work of the bridge in question, of which a large amount is enclosed within the piers, cost no more than 17,000*l.*, while that of the brickwork of the piers amounted to 63,000*l.*

In the application of the suspension principle, on the contrary, it will be sufficient merely to provide an efficient skeleton framing, whether of iron or timber (rendered uninflammable and undecaying by the process previously referred to), on which to rest the roof, and from which to throw out the chains; and the wall enclosure (instead of presenting the enormous, expensive and cumbrous masses of brick and stone work ordinarily employed), may be as slight and thin as the general purposes of shelter and comfort will admit.

Moreover, the necessities of the construction will give occasion for the display of the skill of the artist in the peculiar and consistent treatment and disposition of the prominent features of this skeleton framing; which by this means, and at small additional expense, may be rendered productive of bold relief and singularly beautiful effects of light and shade round the outer circumference of the building; while the grace and grandeur of the sky effects would be greatly enhanced by the display of the suspension chains from corresponding turrets, rendered decided utilities by being made conducive to the necessities of the construction, instead of serving none other purpose than that of ornament,—as witnessed in the new Houses of Parliament, and the majority of occasions, whether in gothic or classic architecture, on which turrets and similar features are employed.

The value and usefulness of this principle of construction will, perhaps, on few occasions be more fully exemplified than in its application to Churches and general purposes of auditory. The serious obstructions presented in these instances by the presence of massive piers and columns—the loss of room for sittings—the inconvenience and discomfort of pews in which they are situated —the impossibility in so many instances of seeing the preacher or chancel where a considerable part of the service is performed—combined with the very serious obstruction to the sound of the voice of the officiating minister—altogether tend to render these the most unfit and inconsistent features that could possibly be applied to such purposes. In every modern instance in which they are adopted, they invariably, and to a considerable extent, counteract the purposes for which the church is erected. On the majority of these occasions, the difficulty of procuring sufficient funds is so pressing, that the most rigid economy and sound judgment is indispensable, in order to effect the union of requisite accommodation with that just regard to grandeur and beauty befitting the sacred purpose to which the edifice is devoted.

The first object, then, is to give the most comfortable accommodation to the largest number of persons that can be gathered within the walls. Massive piers and columns interpose to frustrate this object. Again, it is most essential and desirable that the view be unobstructed throughout the interior, and more particularly that the voice of the preacher or reader be distinctly heard by every person present,—and gothic piers or classic columns present effectual barriers to its diffusion. They are, moreover, very expensive in erection; and to the mind which seeks for beauty as it is seen in Nature, developed in perfect accordance with perfect utility, the effect produced by their use will be unsatisfactory,—since, however indispensable they may be to the particular form of construction exhibited, and however grand and imposing their effect, when applied to purposes wherein their presence is unobjectionable, they on these occasions contradict the principal objects for which the building is erected; and being deficient in, and obstructive to utility, are deficient in the first and most indispensable element of beauty in architecture.

These remarks, be it observed, are exclusively applicable to the support of roofs. It is not to be inferred thereby that every description of incumbent support is in all cases to be rejected, since, in application to the deeply projecting galleries of churches, for example, suspension-chains would occasion perhaps greater obstruction to the occupiers of seats in galleries than columns to those below. In such cases iron interstitial supports, or groups of slender pillars harmonious in design with the general style of the building, would be highly applicable, both as to utility and beauty. The advantages of such introductions over classic columns (while answering the same end as a means of support), will be less occupation of space, the least possible obstruction of light and interception of view and sound, greater lightness, variety and elegance of form, without necessarily greater, and frequently at far less cost, combined with the production of positive as well as optical effects, unattainable in any other style of architecture.

In the design and construction of equivalent features to verandas in application to cottage or villa architecture, supports of similar description would also be admissible; since, when situate on lawns and terraces, they afford facility for the training of rose-trees, jasmines, and other interesting and odoriferous plants: and thereby justify a relaxation of the rigid discipline of Art, in order to admit the exhibition of the more curious workmanship of Nature.

THE IRON SUSPENSION PORTICO is a marked and distinguished feature of this system, occupying a similar position therein to that of the columnar portico of classic architecture. It is beautifully illustrated in the designs of Mr. Pickett, from whose constructive and detail drawings the estimates, so conclusive as to its economy (and referred to at page 10) were made.

In combination with the other and peculiar principles of the system, it is calculated to produce the most graceful and imposing effect, united with exceeding richness in detail, and is shewn to be capable of perfect harmony with the general arrangements of edifices to whatever purpose the art may be devoted.

The advantages, in respect to utility, attainable by the iron suspension portico, beyond that of protection from rain and sun presented in the ordinary colonnade or dwarf portico of masonry, is a saving of the entire space at present occupied by columns and piers, and the consequent avoidance of the dirt and inconveniences resulting therefrom, as likewise those arising from obstructed light, air, and view to and from the windows arranged within; combined with a facility for carriages to set down and take up passengers entirely under, instead of beyond the roof of the portico; and accompanied by opportunity for a far more liberal introduction of glass in the roof, than can possibly be rendered consistent with the heavy and opaque forms of masonry.

On the subject of contraction and expansion of iron, and its influence on constructions of this description, very exaggerated notions are found to prevail. Throughout the whole horizontal length of Charing-cross Bridge, measuring upwards of 1,400 feet, the extreme variations do not exceed from 15 to 18 inches, or something more than an inch to every hundred feet—a contingency which merely requires the precaution of what the workman calls "fitting the joints easy," for the removal of all risk. There are, however, various other occasions which must by no means be overlooked by the architect in iron, wherein the metal is exposed to somewhat high degrees of artificial heat; and here abundance of experience, in numerous analogous applications in the manufacturing arts, as well as in iron ship-building and other purposes of human dwelling, has proved the necessity for, as well as provided ample means of, extended and correspondent precaution.

OF THE FIFTH PRINCIPLE.

The simple elements of every description of form, whether in nature or art, consist in the curved line and the straight. The triangle, the square, the parallelogram, the rhomboid, and every other composition of straight lines, is necessarily angular; whereas, amid the innumerable convolutions of the curved line, exhibited in that masterpiece of natural construction, the human body, there is scarcely an angle to be found. Of these two properties of form, it is obvious that either one or the other must predominate, or become the leading principle of architecture.

In the use of stone in the arts of masonry, so soon as the people had emancipated themselves from the rude custom (doubtless very prevalent in exceedingly remote ages, and specimens of which have been found even among the comparative refinements of dis-entombed Pompeii, still also to be seen in some of our own practices when frigid economy dictates the law of necessity)—namely, that of composing walls of the simple rugged elements of blocks of stone as brought from the quarry. But when the geometric laws of form and quantity became understood and developed, these rude masses of stone were converted into square or angular blocks, and thus the straight line became the primary element of Form in masonic architecture. In the employment of timber also in the erection of walls, although the solid property of the stone wall was necessarily abandoned, and a skeleton framework enclosed with planks or panel-work substituted, yet the granular and fibrous properties of this material, equally with the granular, porous, and brittle substance of stone, and the correspondent facilities for sawing and fitting their respective parts, originally dictated that law which the practices of all subsequent ages have confirmed and established—namely, the law of the straight line as the primary element of form in the arts of timber, as of stone construction.

And here we would beg to direct particular attention to those practices which since the development of the vast resources of iron as a material of construction, and owing to the limitation of the established Forms of Architecture to such as are adapted to the nature of stone and timber—namely, the practice of making iron a mere subservient agent in the arts in question—a practice which the unfortunate habits of hurry and superficial thought, so prevalent in the present day, has tended to perpetuate, even to the inconsistent application of the forms of masonry to the ulterior arrangements of iron-house building.

What is the character of the primary form adapted to the properties of iron in the erection of walls? Is it that of the solid blocks of stone in the masonic erection? No; for that is absurd, and economically impossible in relation to metal. Is it that of the straight-lined forms of carpentry? No; for in application to all analogous purposes of construction, and especially on occasions in the building arts wherein the metal is concealed from view, and consequently where the fundamentals of strength and economy are alone considered, very extensive departures from this description of form is almost invariably observed.

In iron beams for vertical or upright support, especially when required to sustain the weight of superincumbent masses of brick and stone work, or any other ponderous weight, variety of configuration is, with scarcely an exception, found to prevail. Greater breadth is given in some parts than others. Holes and interstices are formed; not alone for the purpose of allowing room for the contraction and expansion of the metal, but of unequalizing or contracting and dilating the quantity in various parts, for the purpose (as before alluded to in the simple example of the fire-poker), of checking vibration, and securing the greatest amount of strength. Even in the chains of suspension bridges, the links, though usually of the same size and configuration, are invariably swelled at the occurrence of the joints, and where the pins are inserted; while the number of these links is unequalized,—that of the bridge before-mentioned having ten and eleven alternately throughout the chain,—a greater amount of strength being secured thereby.

This is fully verified in the example of Nature, in the formation of the skeletons of animals. In the leg-bones, for example, the quantity of solid hard substance continually varies in density and configuration; and we invariably perceive a swelling or spreading out of the bones at the joint, for the obvious purpose of increasing the strength, so as to meet the pressure upon this the otherwise weakest part.

The necessity and advantage of following these examples is proved in almost every department of metallic construction, whether applied to emulate the powers of life in the motions of machinery, or to present a fixed and quiescent resistance to pressure in the general constructions of civil architecture, wherein it is invariably found that strength is greatly increased by giving additional breadth to those parts of framings where a junction takes place, and especially wherever it is found necessary to introduce the pin or screw. This object being best accomplished when the greater breadth at such joint is occasioned, not by a straight and angular projection, but—as in the bone of the animal, and in relation to the similar and originally fluid, ductile, and ungranular substance of iron — by that gradual swelling of the part, which, in each of these instances, illustrates the decided superiority in utility, as well as beauty, of forms which are determined by *curved lines.*

But, notwithstanding that from practical experience, no less than reason and analogy, the curved line is necessarily the ruling element of form in iron constructions, wherein strength and security are most demanded, the necessary uses to which this material is applied in the building arts at all times demand a considerable interposition of the straight line. The walls and floors of houses must necessarily be perpendicular and horizontal; and the general arrangements of windows, doors, cornices, and other features, exhibit a corresponding disposition. In the formation of the iron beams commonly employed in the ordinary styles of building, obedience to this law of necessity is observed in the presence of straight outlines on either one or both outer edges of the beam, according to the situation it is required to occupy, and the duty it has to perform. The swelling and curvilinear forms, which, as before observed, are necessary to the development of the economy of iron, are reasonably so arranged as not to interfere with any of those utilities which the final construction is intended to serve. Bearing in mind, therefore, these necessary and indispensable modifications of the principle before us, it will now be desirable to consider how far the primary element of form, which custom has established in iron construction (and which experience and sound judgment have approved), should be admitted to influence the ulterior arrangements of metallic architecture. In the arts of masonry, those arts which owe their origin to the wisdom and genius of the most celebrated nations and ages of antiquity—and in relation to stone as the employed material of building justly claim the approval of the modern world;—in the arts of masonry, the primary element of form, exhibited in the angular blocks of which the wall is composed, is found to exercise a very important influence over the general character of their design.

"The form of the Grecian temple itself partakes of the character of the cube or parallelogram, while the roof and pediment are conformable with their prior element, the triangle. The doors and other apertures are of angular form; the interior and its compartments angular; the mouldings and primary features of the entablature, though frequently elliptical in profile, are arranged in straight lines, terminating in right angles; and the majority of the arrangements are of similar character."

In the Roman styles of art (which are but modifications, and in most respects deteriorations, of the Grecian orders), notwithstanding the important influence of the extensive introduction of the arch, the straight-lined, square, and angular character and disposition of the primary parts and general details, exhibit a correspondent affinity with the first element of masonic construction. Even in the gothic styles, in which groinings, arched forms, and rounded outlines are, doubtless, to the greatest extent introduced, and angles are carefully concealed from view, as things which the eye of taste would willingly, if it could, reject—still, the law prevailing in the primary construction establishes its characteristics over the general surface of the wall, in the basements of the windows and apertures, the outlines of the buttresses and battlements, the form and disposition of panel work, and numerous other instances; while the later style of this art, commonly distinguished as the "perpendicular" (but to which should, with equal justice, be added, "and horizontal"), exhibits over its general surfaces and ceilings little other than a continued series of enriched and prominent mouldings, arranged in square and straight-lined forms.

Seeing, then, that the primary element of form (namely, the angular block of stone) in the arts of masonry (especially those derived immediately from classic examples, in which the soundest philosophy and purest specimens of art are allowed to exist), is that by which the ulterior forms and arrangements are, to a great extent, determined, it is obviously a dictate of reason, in following out this analogy in the application of iron, that the primary law of form, exhibited in the first element of its construction—namely, the iron beam—should become the entire principle by which the general outlines of the subsequent and ulterior forms of the art should be determined; unless, indeed, it were possible to prove that such an extended application of this law of form was necessarily incompatible with the attainment of utility and beauty in architectural construction, or inconsistent with the ulterior economy of the material upon which it is based.

Here, in respect to durability, we may further note the consequences of introducing the opposite character of form, namely, one of straight and angular outlines, in the arrangements of iron construction exposed to the influences of damp and atmospheric changes. In all receding angles in inverted positions (such, for example, as occur at the basements of windows of the common form) there is a constant tendency to the gathering and soaking in of wet. This, if in iron construction, would present the greatest facility for corrosion. It holds, in fact, in the case of various other materials:—for example, in wooden casks and barrels it is well known to be at the angles where decay and leakage first occur; and if casks were made of iron, with angles of similar description, it would be there that rust and corrosion would first take place. There can be no question that if square instead of circular iron pipes were employed for water-conduits, or any similar purposes, they would be not only dirtier and more unwholesome, from the gathering of the sediment of the water into the crevices, but from the tendency of angles to facilitate corrosion it is questionable if they would last half so long. From these facts the closeness of the affinity between metallic properties and the general law of form exhibited in animal structure is rendered obvious. That of the vertical iron beam and the leg-bone has already been pointed out. In the external forms of animal structure, also, curved outlines are exclusively found to prevail—being no less conducive to every utility of life, than to acknowledged beauty in general appearance.

If in the animal structure prominent right angles were substituted for the curves, it is obvious that continual breakage and injury to the parts would occur. Now, this is precisely the result which takes place from the presence of right angles in the arrangements of architecture. Whether the parts be composed of marble, stone, brick, cement, or plaster, a building can scarcely be completed without a considerable amount of damage having occurred through chipping and breaking of these innumerable angles; while in all places of traffic, such as railway stations, and places of commercial business, it is a very common occurrence to find comparatively new structures reduced, in the basal parts, to the appearance of ruins, from the contact of wheels and packages with the sharp and inconvenient projections of these angles.

Again, as regards receding angles, it is equally evident that if these were substituted for the curves which every where abound in animal structure, great difficulty of cleansing, and consequent disease and decay, would result. It is precisely similar in the arrangements of building. These acute and receding angles, and they are innumerable throughout every style of established architecture (as of common building following its primary type), unavoidably occasion the gathering of dirt and moisture, and present the greatest possible difficulty in cleaning.

The advantages, therefore, in strength and durability, as well as superior cleanliness, resulting from the introduction of small curves in place of direct angles, is equally obvious in the arrangements of building and architecture, as in those of the human frame; and since it is in this latter order of creation, that the highest beauty is universally allowed to reside, it follows as a necessary consequence that, if Art performs her office rightly, in the adaptation of the elementary principle of the curved line (in conformity with the indispensable economy of building arrangements), not only will greater perfection in utility be attained, but the highest order of beauty will result from the introduction.

One of the most striking peculiarities of the architectural and building arrangements now prevalent, is the angular forms of windows. Wherever we turn our eyes along the interminable streets and squares of this giant metropolis, regiments upon regiments of square-formed or angular windows present themselves, until the eye is wearied with the everlasting monotony. If we inquire the advantages resulting from these square forms, where are we to find them? As regards the use of the aperture in the admission of light and air, there is no advantage in the angular top and base that another or modified form would not equally well provide; as regards durability, whether the part be of uncovered brick, or is covered with cement (or if, in fact, it be of stone or marble), angular edges far more readily chip and break than if they were rounded; and while the angles at the top of the window give occasion for insects to harbour, those at the base present the worst possible form for drainage and cleanliness, as they facilitate the gathering of wet, and cause it to soak into the walls. Every domestic is fully aware that the greatest annoyance in house-cleaning occurs at the corners and angles; while, in the operation of painting, every workman equally knows that dirty angles present the greatest obstacles to neat work.

Equal objections hold to the angular form in the sash. The square of glass (as from familiarity almost every form of sheet glass is termed) is a form which far more easily breaks, than if the angles were removed; while it is well known that in the corners the chief trouble in cleaning occurs. Yet the vast majority of the houses and buildings of the metropolis and its environs, as likewise throughout the provinces, are erected in brick; and the form (in all apertures) best adapted to its nature and economy, is well known to be the arch, not the square. The upright arch is invariably adopted for its strength and solidity in bridge building, in vaultings, and all similar purposes; while the inverted arch is equally invaluable as a means of security. There is not a good working bricklayer who does not feel best satisfied by turning his material into arches. He knows that this is the form which makes sound work, and does him credit. The square and angular form into which he is compelled to force it, in common apertures, occasions him much trouble in the process; while the necessary insertion of the lintel and sill produces an opposing thrust, which, on a slight settlement of the building, frequently occasions cracks and fissures in the wall. In addition to this (as before observed), it presents an infinitely worse form for drainage and cleansing, and is beyond all question far less beautiful than the arch. Even when arches are introduced for the summits of windows, the eye of taste and the sense of utility are invariably offended by the insidious introduction of the inconsistent angles at the base. Amidst all the disadvantages attendant upon angular forms, in application to these purposes, the only solitary reason for their employment is that of their presenting greater facility for the use of timber in the formation of the window-frame and sash. But now that a safer and far more durable material presents—and economically presents—itself for application to these purposes,—since not only cast iron, and brass, but zinc and other sheet metals, prepared by handwork, may now be satisfactorily used instead of wood, for window-sashes; and since the angular forms adapted to timber, are in every respect most objectionable in application to metal; it is high time for the introduction of other forms than those which, not only in this, but in almost every point of view, present the greatest obstacles to the progress of improvement: of forms, for the use and perpetuation of which no other reason can be found than that of suitability to the nature of a subordinate and objectionable material, and conformity with the actual practices of ages far removed into regions of antiquity; and of arts, the great merit of which consists in their suitability to climates, circumstances, and general states of society, in the widest degree different from our own.

OF THE SIXTH PRINCIPLE,

Which consists in the application of paint, or some other corresponding substance, to iron, both as a protection from oxidation, and as a means of cleanliness and ornamental effect.*

---

* The Metallic Protoxide Paint (Todd's Patent) is a highly valuable compound for this purpose, as it unites most intimately with iron, to which it firmly adheres, even at a red heat. It resists the action of the sun's rays, as also that of sea air; requires but one coat or application at a time; is perfectly innoxious, being free from all deleterious ingredients, and will admit of being tinted with every variety of colour. With regard to durability, it should be observed that the injurious effects of oxidation may, to a great extent, be prevented by the precaution of heating the *new* casts, &c., and dip-

On the use of paint or similar coating in the masonic Arts, especially in the case of exteriors, care and skill, on the part of the architect, is almost unnecessary,—the natural colour of stone, or the natural appearance of wood, being merely required to be imitated. The paint or colouring substance is applied in simple subserviency to these actual effects. In the use of iron, however, a different state of things exists,—since this is a material of very disagreeable colour (although capable of infinite variety of beauty in form), and requires to undergo a complete transformation in appearance, of which, unlike stone, its own nature does not dictate the precise character. The external coating must, therefore, be applied in obedience to the laws of general effect, as an integral part of the original design, and must be left dependent upon the judgment of the artist.

There is obviously much in the nature of these laws relating to the disposition of Colour—as also, and more especially, in relation to the composition of Form—which the ordinary vehicle of language, whether written or oral, is altogether inadequate to explain. Their general intelligibility, and all the eloquence of which they are susceptible, can alone be fully manifested in the application. The philosophy and the motives, as well as the elementary principles, may be fully and intelligibly explained, and a considerable variety of mechanical and specific rules may also, through the common agency of words, be set forth and understood. But there is a series of mental operations peculiar to the conformation of the true artist—constituting the law within himself—which no other medium than his works can possibly exhibit; and it is therefore to such exhibitions that the reader must be referred for the perfect comprehension of the manner and effects of the application of this principle.

As a general rule, however (though like other general rules, liable to particular exceptions), it may be remarked, that the quality of the effect intended to be produced by this peculiar character of ornamental form will require that the features in question should exhibit somewhat dark and full tones (probably similar to ornamental bronze, when applied to exteriors); while, for the purpose of displaying their intricate forms and peculiar shadows in a pleasing and effective manner, the general surfaces of the building should present a delicate and quiet tint,—relieved, however, by a judicious display of those of opposite character

---

ping them in *oil*, or otherwise applying paint, &c., PREVIOUS to the commencement of the corrosion. The result of the common neglect of this precaution is, that the rust eats its way under the paint, working through in spots on the surface; similar consequences also ensue from galvanizing *over rust* instead of before its commencement.

within the smaller compartments and details of the low-relief ornamental forms.

In connexion with the application of paint, enamel, colour, and gilding, an important point of consideration affecting artistic result presents itself, which is its influence on the general disposition and effects of paintings and other works of art in the interior of edifices.

In the ordinary practice of architecture, greater facility exists for the introduction of works of art in sculpture than in painting, and greater excellence in general effect is attained thereby; because marble or stone is the common material with which the principles of each art, namely, Sculpture and Architecture (according to its previous limits) are conformable, and the nature of which by no means requires the aid of any extraneous covering for the improvement of its effects. The result, therefore, of the juxtaposition of marble sculpture, and marble or stone architecture, provided the proportions and general style of the respective works are harmonious, can scarcely fail in producing unity and beauty in effect.

With the art of painting, however, the case is different. Here we have opposing elements to deal with. On the one hand, we are presented with an art, the course and operation of which is to spread out a coat of paint over a surface, and present illusions of form, and the various phenomena of natural combination, through the agency of superadded colour; while, on the other—that of masonic architecture—we have an art, based upon the properties of a material which nature, reason, and economy almost equally forbid us to colour or disguise, and which cannot, therefore, consistently, be modified either in tint or texture, in order to reduce its raw and cold aspect into something like harmony with the productions of the painting art. And hence the difficulty continually complained of, and the rarity of the circumstance of finding, in the best and most legitimate productions of architecture, a suitable and efficient repository for painting, equal to that which has been found for her handmaid, sculpture, amid the chastened forms of the classic architecture, wherein the mind may contemplate its beauty, and receive the lessons of wisdom it is so eminently calculated to teach, undisturbed by the inharmonious combinations of opposing elements, purposes, and effects.

The metallic system of architecture, on the contrary, being based upon the properties of a material which, equally for preservation as for beauty in effect, demands the interposition of paint, or similar superficial appliance, is calculated to facilitate the preparation of receptacles for works of painting—in the highest degree consistent with their general purposes and effects through the facilities so readily afforded for the introduction of such tints and tones, as well as general disposition of gilded form, as may be productive of harmony with the general effects, whether of an assemblage of pictures, or the particular requirements of individual works. From the same causes, facility is likewise afforded for the special tinting of compartments for the due exhibition of marble statuary (after the example of the Greeks, as witnessed in the tympanums of the pediments of their temples), and which is proposed to be extended to the preparation of receptacles for framed slabs, or medallion works of art in basso-relievo.

The application of the third elementary principle—that of low-relief—in connexion with the principle of superficial covering, will have the effect of introducing the beauties and varieties of colour into the general, and especially the internal, arrangements of edifices, in a manner infinitely more architectural and effective than in common practice, through the limitation of the application of colour to the purpose of giving increased expression and effect to real and tangible form. Instead of endeavouring (as in polychromatic and similar styles of decoration) to supply architectural deficiencies in ornamental form, by the mere representation thereof through the agency of paint on a flat surface; and which, by the exhibition of mechanical powers, and, to a certain extent, similar intentions with those of the higher departments of the painting arts, serves only to render the satisfactory introduction and effect of these productions an object of greater difficulty, if not impossibility of attainment.

The inherent distinctions of character which exist between the foregoing elementary principles and those which form the common basis of every previous style or order of building art, must render it obvious that the result of their combined application (provided the same be effected in conformity with the spirit and intention of the original means) will be none other than the practical establishment of a System of Architecture entirely distinct from those preceding it; and offering many and most important advantages in utility, beauty, and general economy, of otherwise impossible attainment.

Many of these have been referred to in the preceding pages; and it will doubtless have occurred to the apprehension of the reader, that every advantage offered by the 2nd, 3rd, 4th, 5th, and 6th of these elementary principles and appliances of the new system, are, with equal artistic effect, alike open to attainment, whether the first principle of the same be actually adopted, or the common materials of brick and cement be substituted for the hollow-wall construction. It is not, however, to be inferred, from the existence and simple admission of this important fact, that we ourselves are for one moment disposed to admit a general or necessary superiority, in any one respect, of the common over the proposed applications. But Architecture is an art peculiarly governed by circumstances, and the greater the extent and variety of its resources, the more are the interests of society calculated to be benefited thereby.

On occasions wherein portability, economy of space, facility in erection, easy capacity for removal, and other peculiar advantages of the hollow wall, may be a matter of comparative indifference —or where, from local causes, brick, etc., may be applied with more than usual economy, and especially in the case of existing buildings which it may be requisite to renovate and beautify, prudence and good sense would doubtless be found to justify — if not demand—the admission of these appliances, under the treatment of substitutive elements for the iron wall. From the inadequacy of brick for many of the constructive, and nearly all decorative, purposes of architecture, it is an established necessity that it be employed as a partial and substitutive material. The superiority of the modified character of form, described as constituting the 5th principle of this system, over those in common use, in adaptation to the general economy of brick construction, has already been pointed out. While the limited powers of cement, as a medium of ornamental form, and the great expense and speedy decay of carved work in stone, must render obvious the decided advantages of a system of ulterior form which should have the effect of restraining the application of cement to superficial and low-relief ornament, (as described under the 3rd principle).*

In conclusion, we beg leave to remark, by way of caution, to such of our readers as might be disposed to surrender their private judgment to the undue influences of professional opinion, that many persons in every rank of life—and not a few among those accounted wise in the orthodox practice of antiquarian art, or learned in the practical and uninventive common-places of common experience, are exceedingly apt to entertain extremely erroneous notions upon subjects of this nature, as well as to pronounce the most authoritative and conclusive judgment without any fair and efficient examination of the evidence necessary to the formation of a correct decision, or without the natural gift or power of mind to enable them to rightly comprehend and appreciate the nature of the results to be obtained from the *a priori* appliances of a philosophical and inventive art.*

---

* This may be produced at exceedingly moderate cost by means (known to have been applied by the ancients, having been discovered from the ruins of Pompeii) of embossing the pattern or form on the surface of the cemented wall previous to its becoming dry, and supplying these inefficiencies in projection by the introduction of the prominent, durable, cheap, and beautiful cast-iron forms and features, to be attained by the artistic and efficient application of the 2nd principle of this system.

In almost every department of practical science, instances may continually be adduced of the readiness and presumption of learned ignorance, in condemning the most valuable schemes and propositions which have been applied for the benefit of the world.

On the promulgation of the plan for crossing the Atlantic by steam, it was doubtless very easy for the then eminent Dr. Lardner, to assert "that the project could never be accomplished, or if so, could never be practically maintained;" and if the parties engaged in the work had been deterred from proceeding by the influence of this high and positive authority, or others had not been found to go on with it, the learned doctor (and all those, and doubtless, "their name was Legion" who would be found to side with him,) might still have retained credit for wisdom, which had deprived the world of the advantages of this enterprise.

When the celebrated Brindley also proposed his plan for carrying the Bridgewater Canal over the Irwell and Mersey navigation, at Barton, one of the most eminent and practical engineers of the day is said to have sarcastically remarked, that "he had often heard of building castles in the air, but never expected to have been shewn the spot where they were to be erected." It, however, usually happens that while the reputedly wise and experienced are edifying the world by opinions and declarations of this nature, the unlearned or untaught (and therefore incompetent in vulgar estimation), are found to successfully and triumphantly carry out the work.*

---

* In illustration of the extent to which influences of this nature are allowed to prevail, it is a fact which the author is fully prepared to prove, that *previous* to any public, or even any unreserved private disclosure of the principles of his system, and at the time when highly respectable and honourable professional testimony of the most unqualified character had been given in favour of the new art, the following answer to the application of the author for permission to send models, &c., for the inspection of his Royal Highness Prince Albert, was received:—

"Windsor Castle, July 26, 1844.

"Sir,—I beg to acknowledge the receipt of your letter, and to acquaint you that I have laid that which it enclosed before his Royal Highness Prince Albert. From the *investigation* which his Royal Highness has made on the subject of your *invention*, he regrets to say that *he does not consider it of any value and importance*, and will therefore *not trouble* you to send any models for his inspection.

"I have the honour to be, sir, your most obedient servant,

"G. E. Anson.

"Wm. V. Pickett, Esq."

The reply of Brindley to his noble patron, on communication of the presumptuous sarcasm of the engineer, was characteristic of the superior confidence and energy of natural genius over acquired and scholastic talent:—"Give me the means, and I will do it." The means were given, and the work was done. It still exists as a pattern and example to future ages; and in the hope that similar means and correspondent powers will not be wanting to bring the many advantages of this System of Architecture home to the practical possession of the people of this country—and through their industry and enterprise diffuse the same throughout the world—we would, for the present, take leave of the subject, by referring the reader to the considerations contained in the accompanying pages.

---

* It is recorded of Brindley (than whom, if the state of science in his day, and the magnitude, originality, and difficulty of his works be taken into account, it is questionable if a greater power and genius among modern engineers can be named,) that he was destitute not only of a professional, but even of a common education. His greatest works are stated to have been carried out without models, drawings, or plans, which latter he was unable to produce; while, in proof that natural and unfettered mental energy possesses a superior power of appreciation, as well as performance, it is found that the noble, confiding, and generous patron of this extraordinary man, the third and truly great Duke of Bridgewater, had from ill health during youth, been almost equally deprived of the usually termed *advantages* of education.

AN ADDRESS TO CAPITALISTS.

A CONTINGENT of the foregoing System of Architecture, peculiarly calculated to affect the interests of a commercial and enterprising nation like our own, is the Portability, and consequent Exportability, of every description of edifice constructed in accordance with its principles, and the harmony of its economy with the ordinary routine of manufacturing and commercial operations.

In almost every department of iron manufacture—from the smallest article of personal use to the most extensive and important works of the age—experience fully proves that the real economy of the material can alone be developed in the manufacture of great numbers of the same thing. Instances might easily be adduced, wherein five, or even ten, gross of ornamental buttons, can be procured at less cost than would be required to make a single button, provided it had to be made to a particular pattern, and there was no further demand for it.

The same contingent holds throughout the whole range of pottery and porcelain manufacture, as likewise in the case of stoves, fenders, and almost every article of domestic use; as well as with iron railings, gates, balconies, and, in fact, every variety of ornamental cast iron work. It is never a single product, or even a moderately extended number of repetitions, that can be obtained at the cheapest rate (although even in the latter case the economy of iron appliance will considerably exceed that of other means and materials), but in proportion as the demand and application is increased, the expense of production, or rather of purchase, is diminished; and this, in the majority of instances, to so great an extent, as to outvie the economy of almost every other branch of manufactures.

The great extent to which the repetition of corresponding parts and features is required for the attainment of good effect, as well as for the due provision of utilities in architecture, constitutes an affinity between the essential conditions of the art, and those of our industrial manufactures, which, if efficiently carried out, cannot be otherwise than largely conducive to the prosperity of the latter, and the promotion of commercial interests generally. The enlarged commercial principle which enables the manufacturer in the useful, or the publisher of engravings in the fine arts, to realize his profits by spreading the cost of production over an extensive number of copies, is, moreover, no less in accordance with the general principles of art in architecture, than with the wants of society in the production of cheap and improved buildings, especially of a portable character, and constitutes the practical carrying out of this system on an extensive scale, an object peculiarly fitted for commercial enterprise.

It is not, however, from the foregoing contingencies, to be inferred that copies of entire edifices, repeated to an indefinite extent, would be at all indispensable to profitable economy in this art. The same features and parts, like a category of words in language (or like the established features of masonic art) being fully capable of re-arrangement and extensively varied adaptation, with equal, and frequently improved effect to that of the original application. Always, and of necessity premising that such varieties in the composition and arrangement of features and parts, be effected by and under the superintendence of the artist-architect, possessed of skill and experience in the use of the peculiar elements of the art.

The improved economy resulting from extensive repetition of parts, although more peculiarly affecting ornamental work (owing to the expense of modelling, and difficulty of clearing the first casts), is by no means limited thereto, since plain casting involves an expense for models; and after the workmen have become accustomed to the particular forms, and the difficulties of producing the first few casts are overcome, they can proceed with succeeding repetitions with increased facility and dispatch.

For this reason it is generally found, that in cases where a single work—an iron house, for example—is required, recourse is almost necessarily had to malleable metal and hand-work, to a much greater extent than either cheapness, or any other advantage in the building, would dictate; because the limited number of the same parts required for the one work, and the uncertainty of the manufacturer having further use for the models, renders the application of casting with economical result unavailable.

From the difficulty thus besetting the production of iron houses, even of the plainest possible description, and the fact of the majority of founding and engineering establishments being engaged upon more extensive and profitable works, combined with the almost total neglect of constructions of this nature on the part of architects and builders, the difficulties of procuring the manufacture of iron houses, and the want of general and correct information respecting them, operate most seriously and unquestionably to their disuse, notwithstanding the importance of the advantages in many instances to be derived from them.

And whether it be in the case of the occupier of doubtful or short-titled land, desirous of erecting a moveable mansion, villa, residence, or dwelling-house, the proprietors of mines and quarries (liable to become exhausted) requiring lodgings and cottages for workmen and labourers, as well as buildings for stores and machinery; of parties desirous of erecting churches, chapels, or schools, amid a floating population, and in doubtful or temporary localities; or that of the emigrant of small capital wishing to carry out to the colonies a dwelling-house capable of speedy erection, and thereby avoid the hardships, delay, and difficulties usually attendant upon procuring similar shelter in a new settlement or district,—it is more than probable that on applying to parties who may have had some experience in the erection of portable and fire-proof buildings, and naturally requiring an estimate and guarantee of the cost, as well as limitation of the time for completion, he will be informed that "their establishment is so fully occupied with the building of iron ships, or the preparation of iron for railroads and other extensive and ready works, that it is indifferent to, or cannot undertake the preparation of so small a work."

But further, from the circumstance of the manufacture of portable buildings having been hitherto effected either by the founder—who would make them almost entirely of iron, or the carpenter and timber-merchant making them exclusively of wood—the application of various other materials (that of slate slabs *or tile pottery*, for example, offering greatly superior advantages in economy and durability, as well as security from fire,) has been almost entirely neglected. And, at all events, under the existing state of things, it is impossible that the resources of nature in the product of materials, and of art and science in the wise and efficient use of them, can be fairly and effectively developed in application to portable building construction.

It has long been held as essential to the welfare of our colonial settlements, that small and moderate capitalists be encouraged to emigrate; and the difficulty of procuring houses, whether in the colonies themselves, or at home, of a character adapted to transit, is a very serious impediment to persons in anything like comfortable circumstances, in proceeding out. The removal, therefore, of obstacles such as these, by the systematic development of true economy and improvement in portable-house building, is equally desirable and essential in a political and philanthropic, as in a commercial, scientific, and industrial point of view.

Moreover, it would be an object of little doubt with the capitalist whether considerable profits might not be realized (and one of no question as to the social advantages to be attained,) by sending out shiploads of these houses, planting them in the colonies, and letting them at yearly rents (payable either in coin or produce, saleable in the home markets) to settlers; or otherwise disposing of them upon the general principles so extensively, and, it is believed, beneficially acted upon by Building and Investment Societies in this country.

It is not, however, in reference to the demands of individuals for portable dwelling-houses uniting cheapness with comfort, that the benefits of systematic and well-organized arrangements for this object assume the most important aspect. For government stations, barracks, military stores, as also for churches, chapels, schools, hospitals, and numerous analogous objects of colonial use, continual demands exist for building arrangements, without the difficulty, delay, and necessary inferior result of construction in new settlements—demands which would unquestionably be greatly increased in proportion to the economy and perfection with which portable edifices of superior and architectural character could be procured at home.

The accomplishment of an object so important and beneficial to our own people, would also be calculated to extend the benefits thereof to various and especially more southern nations; while at the same time, by the extension of the reciprocities of commercial intercourse, the prosperity of this country would be enhanced.

In Turkey, for example, in consequence of the great scarcity of stone and similar materials, their houses are built almost entirely of wood.

Hence the awful destructions of their cities by fire—a calamity the extent of which might, in a great measure, be averted through the introduction, if only at intervals, of fire-proof edifices; and which the proverbial wealth of Turkish merchants and grandees, as well as of the Sultan and Government of the Sublime Porte, would render them well able to afford.

A similar state of things is likewise found to prevail among the princes and people of India, where in addition to peculiar exposure to fire and lightning, the destructive ravages of the white ant in timber, creates an enormous addition to the expense and trouble, as well as insecurity attendant upon their usual wooden buildings.

In the West India Islands, also, correspondent circumstances exist; and there the great superiority of iron houses over all others has long been fully proved, not only in respect to the evils above stated, and common to Eastern India, but to that of the hurricanes peculiarly affecting these localities, and the heaving and rolling of the ground in earthquakes, when houses of brick and stone become speedily reduced to ruins.

But independently of the extensive demands for portable buildings, calculated to result from the application of this System of Architecture, providing as it does, the requisite types for constructions of this description, it is obvious that the introduction of an order of forms in useful and ornamental features, in accordance with the second principle, and applicable to every description of building material that can be employed for walls, must ultimately (from their exceeding cheapness and durability, no less than the superior beauty and utility attainable thereby,) present a vastly extended means of wealth and industrial occupation, no less advantageous to the enterprising capitalist than to the interests of society at large.

NOTE.—Mr. William Vose Pickett (author of and holder of Patent-right in this System of Architecture,) begs to announce, that he is ready to produce designs, plans, &c. for every variety of edifice, as likewise for the alteration of existing buildings; to provide the sectional and detail drawings of such works, and superintend the erection of the same, in conjunction with parties possessed of requisite skill and experience in the use of the materials in construction, &c.

24, *Belgrave Road, Pimlico, London,*
May, 1849.